the handbook of the

ROLLS-ROYCE

SILVER SHADOW

and

BENTLEY

T SERIES

SECOND EDITION

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T SERIES

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SECOND EDITION

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PREFACE

Rolls-Royce Silver Shadow and Bentley T series cars are designed and built to very high standards of precision and quality and before leaving the factory, each car is thoroughly tested and adjusted by experts.

The information contained in this Handbook has been carefully compiled to enable the owner to enjoy the utmost satisfaction from his car. The life and reliability of your car depend to a large extent upon the care and attention it receives from the outset, therefore, it is important that the instructions given in this Handbook are carefully observed.

It is important that the service operations called for are carried out at the mileage intervals specified. Arrangements can be made for servicing your car at any of the Rolls-Royce Retailers or at the Service Departments in London or Crewe.

Rolls-Royce policy is one of continuous engineering improvement and the right is reserved to revise the contents of this publication without prior notice.

"Features of the hydraulic control of the brake system licenced by Soc. Anon. André Citroën under French Patent Number 1,014, 251 and Pat. of Add. Number 61, 598".

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Telegrams: 'ROYCRU, CREWE'
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DATA

CHASSIS NUMBER .....

ENGINE NUMBER .....

COMPRESSION RATIO .....

BODY NUMBER .....

.....

UPHOLSTERY .....

.....

PAINTWORK .....

.....

.....

SPECIAL FEATURES .....

.....

.....

PERSONAL MEMORANDA

CAR KEY NUMBER.....

CAR REGISTRATION NUMBER.....

DRIVING LICENCE NUMBER.....

RENEWAL DATE.....

ROAD LICENCE RENEWAL DATE.....

RADIO LICENCE RENEWAL DATE.....

INSURANCE POLICY NUMBER.....

RENEWAL DATE.....

MOTOR CLUB MEMBERSHIP NUMBER.....

RENEWAL DATE.....

OWNER'S NAME.....

ADDRESS.....

TELEPHONE NUMBERS

PRIVATE .....

BUSINESS.....

RETAILER.....

DOCTOR .....

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AFTER SALES SERVICE

It is our ambition that every Rolls-Royce and Bentley owner shall be completely satisfied with his car. With this object in view, facilities are provided to ensure an efficient after sales service.

The Retailer, through whom your car was purchased, has a service department provided with special tools and equipment for maintaining Rolls-Royce and Bentley cars, and has personnel specially trained to deal with all service matters.

Rolls-Royce and Bentley service engineers are available at all times for consultation on any matter concerning your car. They have access to the latest information from the factory and are able to give advice and assistance to Retailers, with whom they maintain regular contact.

We invite you to take advantage of these service facilities by contacting your nearest Retailer, who will be glad to place all his knowledge and facilities at your disposal. Arrangements can be made with him for carrying out Maintenance Schedules at the specified mileages as described in this Handbook.

When making an enquiry to Rolls-Royce Limited or to a Retailer, it will facilitate matters if the chassis number of the car is quoted.

Overseas touring spares kit

Owners intending to take their cars to overseas countries are invited to contact the Technical Services Department at Pym's Lane, Crewe, for advice and assistance regarding service facilities.

A kit of spare parts, consisting of small units which might not be available in more remote areas, can be obtained from your local Retailer or from the Spare Parts Department at Crewe or London.

The cost of this kit will be refunded, less a small loan fee, if returned intact.

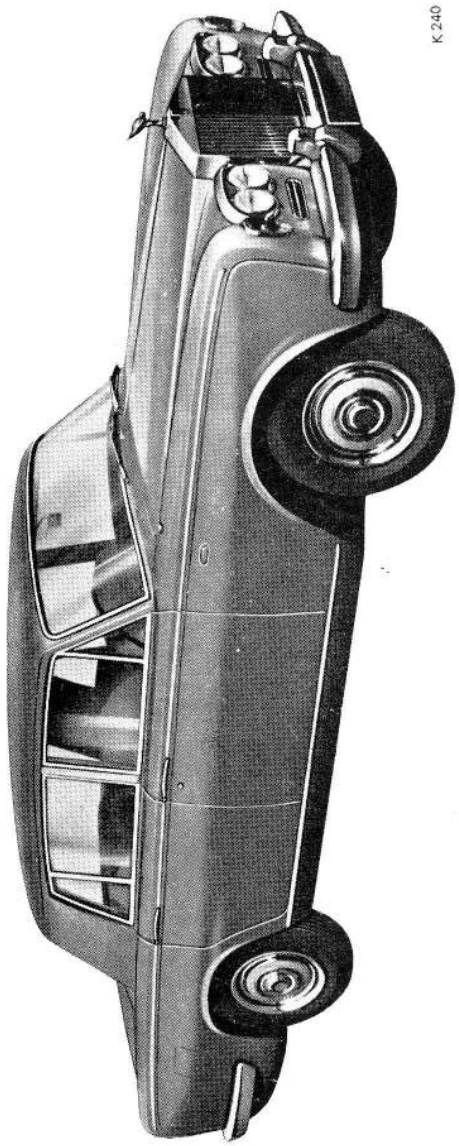


Fig 1 ROLLS-ROYCE SILVER SHADOW

GENERAL INFORMATION

Air conditioning system

Fresh air heating and ventilation system controlled by two switches on the facia. Outlets are provided at the base of the windscreen, under the facia and at the rear of the front seats. Two fully adjustable outlets on the facia with independent controls supply fresh air only. The air can be boosted in all these systems by two blower motors controlled by a five position switch.

Additional 'ram' fresh air is also provided through an outlet in the driver's side scuttle wall which is independently controlled.

If a refrigeration system is fitted, cold air will be supplied through the two fully adjustable outlets in the facia and the outlet in the centre of the facia when the system is operating.

Automatic gearbox

The automatic gearbox transmits the drive in four forward ranges and reverse. Gear changes are made automatically and are obtained through a fluid coupling and three epicyclic gear trains. Gear changes may be promoted manually by means of the gear range selector lever and the 'kick-down' change arrangement (see Page 44).

The ratios are as follows:

Gear	*Gearbox ratio*	*Overall ratio*
1st	3.82 : 1	11.75 : 1
2nd	2.63 : 1	8.10 : 1
3rd	1.45 : 1	4.46 : 1
4th	1 : 1	3.08 : 1
Reverse	4.30 : 1	13.25 : 1

Final drive unit ratio – 3.08 : 1

An efficient parking lock is incorporated in the gearbox; this lock engages when the reverse gear is selected, providing the ignition is switched off.

Automatic height control system

This system is a fully automatic hydraulic system and maintains the standing height of the car regardless of loading. With the gear lever in any position except neutral, the system is on slow levelling. When neutral is selected or a door is opened the system then changes to fast levelling.

A warning lamp on the facia will be illuminated if there is a lack of hydraulic pressure.

Brakes

Disc brakes are fitted to all wheels. Each front wheel is fitted with two twin cylinder calipers and each rear wheel with one four cylinder caliper.

The braking system comprises three separate and independent hydraulic circuits, two power brake circuits and one master cylinder brake circuit. These circuits operate in parallel and failure of any one leaves the other two unaffected. Two warning lamps are provided on the facia, one for each high pressure circuit. If lack of pressure occurs in one of the high pressure circuits, the relevant lamp will be illuminated.

The hand brake operates through mechanical linkage and applies two small brake pads on each rear wheel disc. If the ignition is switched on, a warning lamp on the facia is illuminated when the hand brake is applied.

If a stop lamp bulb fails, this lamp will warn the driver when the foot brake is applied.

Capacities

	Imperial	*U.S.*	*Metric*
Fuel tank	23½ gal.	28 gal.	107 litres
Cooling system	28 pt.	33½ pt.	16 litres
Engine oil sump			
Without changing oil filter	12¾ pt.	15¼ pt.	7 litres
When changing oil filter	14½ pt.	17½ pt.	8 litres
Gearbox and fluid coupling	24 pt.	29 pt.	13.6 litres
Final drive unit	4½ pt.	5½ pt.	2.5 litres
Drive-shaft ball and trunnion joint (each)	—	—	150 c.c.
Steering pump reservoir	3 pt.	3½ pt.	1.7 litres
Steering idler box damper	⅝ pt.	¾ pt.	330 c.c.

Cooling system

25% anti-freeze mixture used all the year round, circulated by centrifugal pump. System pressurised at 7 lb/sq. in. Temperature controlled by thermostat. Warning lamp is illuminated when the coolant level is too low.

Dimensions

Wheelbase	9 ft. 11½ in. (3.04 m.)
Track – front and rear	4 ft. 9½ in. (1.46 m.)
Road clearance	6½ in. (16·5 cm.)
Turning circle	38 ft. (11·58 m.)
Overall length	16 ft. 11½ in. (5.17 m.)
Overall width	5 ft. 11 in. (1·80 m.)
Overall height	4 ft. 11¾ in. (1.52 m.)
Weight (car unladen but complete with oil, coolant and a full tank of petrol)	4636 lb. (2103 kg.)
One gallon of petrol weighs	7½ lb. (3.4 kg.)

Electrical system

12 volt system using a 64 ampere hour battery with negative earth. Four 'sealed beam' headlamps, electrically operated front seats, electrically operated windows, electrically operated radio aerial, two speed windscreen wipers, windscreen washers, under bonnet lamp, roof lamps, reading lamps and cigar lighters.

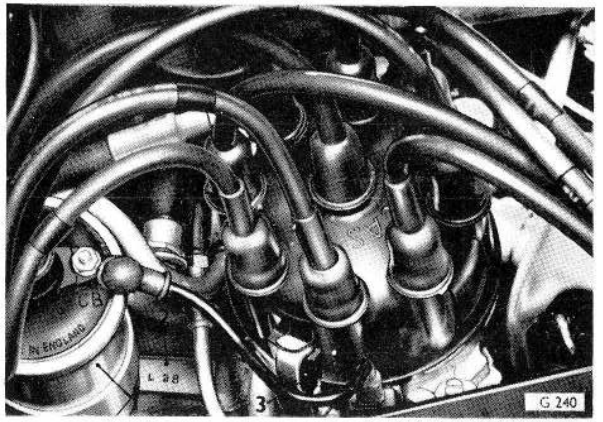


Fig 2 POSITION OF ENGINE NUMBER

1 Ignition coil
2 Engine number
3 Ignition distributor

Engine and chassis serial numbers

The engine serial number is stamped on the rear of the crankcase (see Fig. 2).

The chassis serial number is stamped on the title plate on the left-hand side of the bulkhead.

The full chassis number must be quoted in all correspondence regarding the car; the engine number need not be quoted unless specifically requested.

Engine

Bore	4.100 in. (10.41 cm.)
Stroke	3.600 in. (9.14 cm.)
Number of cylinders	8 in two banks of 4
Total capacity	380.5 cub. in. (6.23 litres)
Compression ratio	9 : 1 or 8 : 1 according to the car's domicile.
Firing order	A1, B1, A4, B4, B2, A3, B3, A2 'A' bank is on the right when viewed from the driver's seat.
Sparking plugs	Champion N.14.Y
Ignition timing	2° before T.D.C.
Vibration damper	Metal—rubber bonded.
Valve gear	Overhead in line, push rod operated through self-adjusting hydraulic tappets.
Hydraulic brake pumps	Two pumps are fitted, one at the front of the engine and one at the rear; the pumps are camshaft operated through solid integral push rods and tappets.
Oil filtration	Full flow.

Final drive unit and rear cross-member

The final drive unit is rigidly mounted on a cross-member which in turn is mounted to the car body underframe by two rubber mounts. A torque arm is flexibly mounted between the rear cross-member and the rear sub-frame to absorb the torque reaction of the final drive unit.

The final drive unit casing contains hypoid bevel gears having a ratio of 13/40 (1 : 3.08). Drive is transmitted to the rear wheels by two drive-shafts; the inner end of each shaft is connected by a ball and trunnion joint and the outer end by a universal coupling.

Top gear speed per 1,000 r.p.m. is 26.2 m.p.h.

Front sub-frame and front suspension

The front sub-frame is manufactured from welded sheet steel and is mounted on resilient metal mounts at the four corners of the car body underframe.

The front suspension is an independent coil spring arrangement with double acting hydraulic shock dampers, an anti-roll stabiliser and a transverse locating rod, all of which are attached to the front sub-frame.

Fuel system

Fuel pump	Twin SU electric.
Carburetters	Twin SU HD8, 2 in. bore, side draught. Automatic control for starting.
Air silencer and cleaner	Underwing air silencer with paper or oil wetted wire mesh air filters (see Page 77).

If your engine has a compression ratio of 9 : 1 use 100 octane fuel to obtain the most satisfactory performance; for engines with a compression ratio of 8 : 1 use premium grade fuels.

Power assisted steering

Power assisted steering is provided, the steering box being supplied with hydraulic fluid under pressure by an engine driven pump.

The steering idler box, fitted on the opposite side of the car to the steering box, incorporates a hydraulic damper; this damper gives protection against any violent reactions at the road wheels.

The number of turns of the steering wheel from lock to lock is four.

Propeller shaft

The single piece propeller shaft incorporates resonance dampers. The front of the shaft is connected to the gearbox output shaft by a ball and trunnion joint. The rear of the shaft is connected to the final drive input flange by a universal joint.

The propeller shaft assembly is dynamically balanced to fine limits.

Radio receiver

Medium and long wave	Radiomobile 980VT, all transistorised.
Medium and short wave	Philips N6X16T all transistorised.
Medium wave only	Pye PE2000T, all transistorised.

Rear sub-frame and rear suspension

The rear sub-frame is manufactured from welded sheet steel and is mounted to the car body underframe using resilient metal mounts. Three compliance dampers and two tubular steady links are mounted between the car body underframe and the rear sub-frame to control and restrain the movement of the sub-frame. The two outer dampers are resilient metal dampers and the centre damper is a double acting single tube hydraulic damper.

Rear sub-frame and rear suspension *(continued)*

The rear suspension is an independent coil spring arrangement with trailing arms and double acting hydraulic shock dampers; the trailing arms are pivotted on the rear sub-frame.

Tyres

Tyres are under continuous development and reference should be made to a Retailer for the latest recommendations.

Size 8.45–15

The recommended tyre pressures are:

Front and rear 26 lb/sq. in. (1.83 kg/sq. cm.) cold.

For continuous high speed motorway driving the tyre pressures should be increased by 2 lb/sq. in. (0.14 kg/sq. cm.) i.e. to 28 lb/sq. in. (1.99 kg/sq. cm.) cold.

CONTROLS, INSTRUMENTS AND ACCESSORIES

DRIVER'S CONTROLS AND INSTRUMENTS

Before driving the car for the first time, you are advised to study carefully the position and operation of the controls and instruments which are illustrated in Figures 3 and 4.

The use of the controls will in most cases be obvious to you, but the following notes will assist in understanding the function of the various accessories.

Accumulator warning lamps

The two red lamps on the facia marked 'BRAKE', warn the driver of the lack of hydraulic pressure in either or both of the power braking systems. The left-hand warning lamp will be illuminated if the front brake pump hydraulic circuit fails; the right-hand warning lamp will be illuminated if the rear brake pump hydraulic circuit fails.

The warning lamps may be illuminated prior to starting the engine but should be extinguished immediately it is started.

A testing circuit is provided to check that the warning lamp bulbs are satisfactory. To carry out this check, switch on the ignition and press the fuel/oil level switch; all the lamps in the main warning lamp panel should then be illuminated.

Aerial switch

To raise the electrically operated aerial, lift up the switch on the right-hand side of the radio receiver (see Fig. 3). To lower the aerial, press down the switch.

Air conditioning switches

The two switches on the facia, marked 'UPPER' and 'LOWER', control the upper and lower heating and ventilation systems respectively; fresh air is available also through the ducting for either system when the switch for that system is withdrawn whilst in the vertical position.

Operation of the switches is fully described in Chapter 10, but to summarise, the heat available is increased as each switch is turned progressively clockwise and the quantity of air available is increased as each switch is

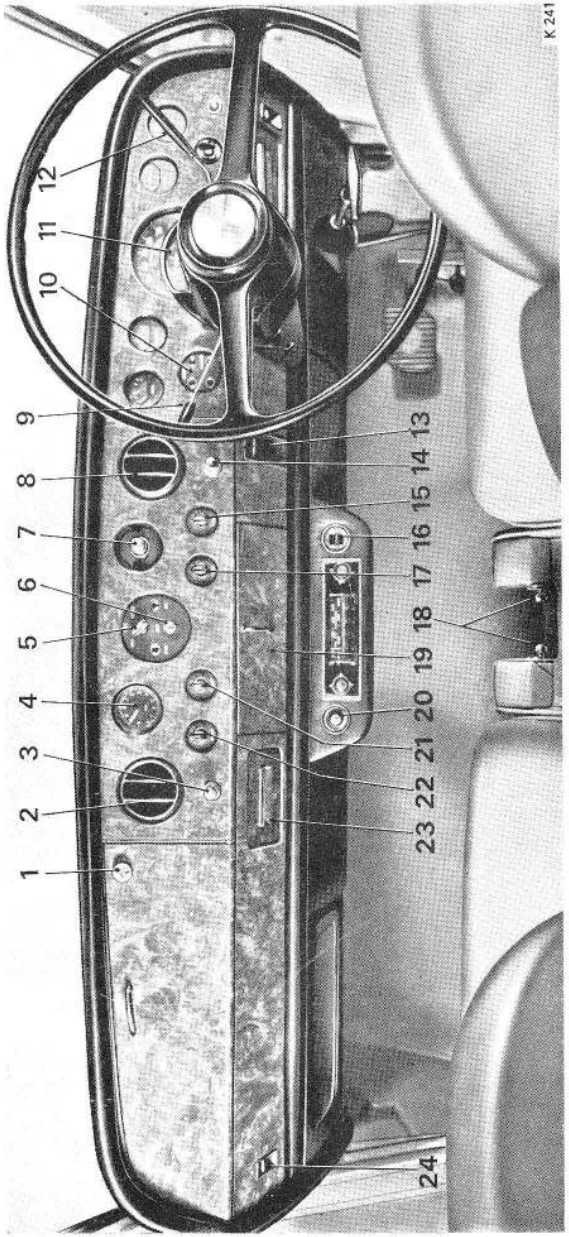


Fig 3 DRIVER'S CONTROLS

1 Facia compartment lock
2 Adjustable outlet for fresh air
3 Control for adjustable outlet
4 Adjustment knob for hands
5 Main lighting switch
6 Ignition switch
7 Cigar lighter
8 Adjustable outlet for fresh air
9 Direction indicator/headlamp flashing switch
10 Main warning lamp panel
11 Gear range indicator
12 Gear range selector lever
13 Blower motors switch
14 Control for adjustable outlet
15 Windscreen wiper/washer switch
16 Aerial switch
17 Instrument lamps switch
18 Front seat switches
19 Air conditioning flap
20 Loudspeaker balance control
21 Lower heating and ventilation switch
22 Upper heating and ventilation switch
23 Ash tray
24 Switch for passenger's roof lamp

withdrawn; there are three withdrawal positions for each switch. The quantity of air can be augmented by operating the blower motors. If a refrigeration system is fitted, the switch marked 'UPPER' controls this system and the temperature of the air is reduced as the switch is turned anti-clockwise; withdrawal of this switch in any of the anti-clockwise positions has no effect. It should be noted that heating in any system is not available when the refrigeration unit is operating. The blower motors should be operated to recirculate the refrigerated air.

The switch for the blower motors is positioned near the centre of the lower facia (see Fig. 3). This switch has four positions from the off position and the speed of the motors is increased when the switch is lowered progressively.

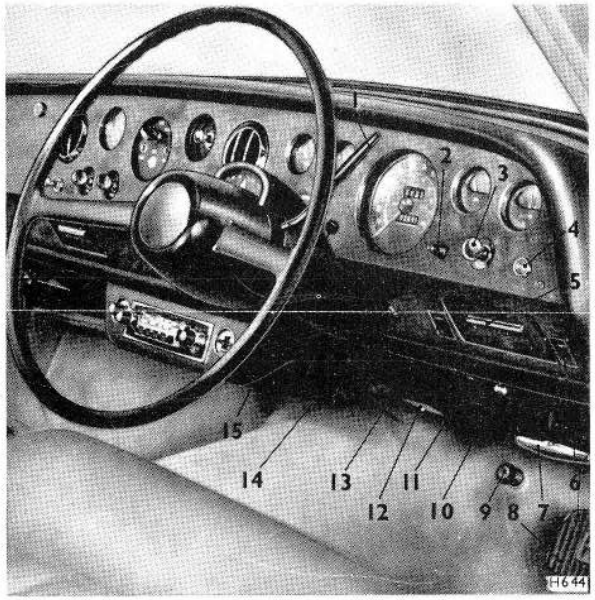


Fig 4 FACIA DETAILS

1 Gear range selector lever
2 Speedometer trip release
3 Parking lamp switch
4 Hand brake/stop lamp bulb failure warning lamp
5 Ash tray
6 Driver's roof lamp switch
7 Hand brake
8 Foot brake pedal
9 Headlamp dipping switch
10 Fuse box cover securing screw
11 Fuse box cover
12 Bonnet lock control
13 Rear window demister switch
14 Fuel filler door switch
15 Fuel/oil level indicator switch

Fresh air control ducts

A circular outlet duct on each side of the facia (see Fig. 3) supplies fresh air, by ram effect, when the knob beneath the duct is withdrawn. The ducts may be swivelled to direct the air as required. If desired, the air through these ducts can be boosted by the blower motor. When both the 'UPPER' and 'LOWER' switches are in the vertical position, fresh air will be available also through the duct in the centre of the facia when the flap is lowered. If a refrigeration system is fitted, cold air can be supplied through these ducts.

A fresh air duct is provided in the driver's side scuttle wall also (see Fig. 53). The outlet grille is connected by a duct to an intake in the front wing and air enters the intake by ram effect, induced by the forward movement of the car. The outlet grille in the scuttle wall has an internal flap valve, cable operated and controlled independently by a withdrawal knob on the driver's side of the facia (see Fig. 3).

Ammeter

The ammeter is mounted on the facia as shown in Figure 3 and indicates the rate at which the battery is charged or discharged; under normal operating conditions, a charge rate is indicated.

When the engine is started, the ammeter will indicate a high rate of charging which will remain for a short time before gradually falling to suit the condition of the battery.

Bonnet lamp

A lamp, provided beneath the bonnet lid, illuminates the engine compartment whenever the bonnet lid is raised. If the bonnet lid is closed with the lamp on, a plunger type switch will switch off the lamp automatically. A switch is incorporated in the lamp to enable the lamp to be switched off when not required, for example during daylight.

Bonnet lock control

The bonnet lock control is on the lower half of the facia adjacent to the steering column (see Fig. 4).

To open the bonnet, lift up the control then raise the rear of the bonnet until it is fully opened. Assistance in opening the bonnet is provided by coil springs, which also maintain the bonnet in the raised position.

Brake and accelerator pedals

The brake and accelerator pedals are fitted in the standard positions and are operated in the normal way. 'Kick-down' of the accelerator pedal for gear changing is described on Page 44.

Clock

The clock is electrically operated and the hands are set by depressing the centre knob and turning in the required direction.

Coolant level warning lamp

The amber lamp on the facia marked 'COOLANT' is illuminated when the level of coolant in the radiator header tank is too low.

A testing circuit is provided to check that the warning lamp bulb is satisfactory. To carry out this check, switch on the ignition and press the fuel/oil level switch; all the lamps in the main warning lamp panel should then be illuminated.

Coolant temperature indicator

The instrument on the facia, marked 'COOLANT' operates only when the ignition is switched on. Under normal operating conditions, the needle should register a temperature within the broad white band on the instrument scale.

Direction indicator and headlamp flashing switch

The direction indicator switch mounted on the left-hand side of the steering column is designed to operate the direction indicators and to flash the headlamps; these operations can be performed separately or simultaneously. The switch operates only when the ignition is on.

To indicate a turn to the right, move the switch lever up; for a turn to the left, move the lever down. The switch is self-cancelling when the steering wheel is returned to the straight-ahead position.

To flash the headlamps, draw the switch lever toward the steering wheel. It is not possible to flash the headlamps if they are on main beam.

Fuel filler door switch

The fuel filler door in the right-hand rear wing, is electrically operated and is released by pressing the switch button on the facia (see Fig. 4).

Should the solenoid fail, the catch can be freed manually by pulling the release ring in the luggage compartment (see Fig. 13).

Fuel level warning lamp

A green lamp, on the facia, marked 'FUEL' warns the driver when the level of fuel in the tank falls below three gallons.

A testing circuit is provided to check whether the fuel level warning lamp bulb is satisfactory. To carry out this check, switch on the ignition and press the fuel/oil level switch; all the lamps in the main warning lamp panel should then be illuminated.

Fuel and oil level indicator

The instrument on the facia marked 'FUEL' indicates the amount of fuel in the tank whenever the ignition is switched on.

The oil reserve in the engine sump will be indicated on the same instrument by pressing the push button on the facia (see Fig. 4).

To ascertain whether the main warning lamp panel bulbs are satisfactory, press the switch with the ignition switched on; all the lamps in the main warning lamp panel should then be illuminated.

Gear range selector lever

The gear range selector lever is mounted on the steering column as shown in Figure 4. Operation of the lever is described on Page 42. The gear range indicator scale is illuminated whenever the instrument lamps are switched on.

Hand brake

The hand brake handle is mounted in a convenient position under the facia and operates, through mechanical linkage, two hand brake pads on each rear wheel disc.

To apply the hand brake, the handle should be pulled towards the driver; turn the handle clockwise and depress to release the brakes. When the hand brake is applied and the ignition is switched on, an amber warning lamp on the facia is illuminated.

Hazard warning system (if fitted)

This system is so designed that if the switch, positioned between the two sun visors, is depressed, both the two front and two rear flashing indicators will flash at the same time; also, a red warning lamp in the end of the switch will flash in synchronism with the indicators. The hazard system can be operated with the ignition on or off.

The flashing lamps warn approaching drivers of danger e.g. an accident or that the car is immobilised.

Horns

The twin Windtone horns are operated by the push-button in the centre of the steering wheel. The horns can be operated only when the ignition is on.

Headlamp dimming system (if fitted)

If your car has a headlamp dimming system, it will operate automatically when the ignition is switched on and the main lighting switch is turned to the 'S & T' position. In this position, the side lamps, tail lamps and the dipped filament of each outer headlamp are illuminated. When the main lighting switch is turned to the 'S & T' position, the current for the headlamps passes through a resistance and so produces a dimmed light.

When the ignition is switched off, for example when parking with the side and tail lamps illuminated, the dimmed headlamp beams will be extinguished.

When the main lighting switch is turned to the 'H, S & T' position, a relay cuts out the dimmed circuit and the headlamps are supplied with the full current for both the dipped and the main filaments.

Headlamp dipping switch

The plunger type dipping switch is foot operated and is mounted on the toe board adjacent to the steering column (see Fig. 4).

To dip the headlamp beam, press the switch, then release it; repeat this procedure to obtain the main beam.

A small warning lamp is illuminated whenever the headlamps are on main beam. This lamp is mounted centrally between the direction indicator warning lamps on the lower part of the speedometer. The warning lamp may be either red or blue depending upon the type of speedometer fitted.

Ignition and starter switch

The ignition switch can be turned either clockwise or anti-clockwise from the off position.

Turn the key anti-clockwise to enable the radio receiver, aerial, windscreen wipers and cigar lighters to be operated; this position also allows the fuel filler door to be opened. The ignition warning lamp will be illuminated when the ignition switch is in this position, but the engine ignition circuit is not energised. This position is ideal for picnicking, for example, when it is required to use the electrical accessories without the ignition being in circuit.

Turn the key clockwise to energise the ignition circuit, fuel pumps, all instruments and warning lamps, air conditioning system, front seats, rear window demister, horns, headlamp flashing, reversing lamps and direction indicators; also energised are those electrical components which are energised when the key is turned anti-clockwise.

To operate the starter motor and start the engine, turn the key further clockwise against spring pressure. Immediately the engine starts, release the key to allow the switch to return automatically to the ignition position. The starter motor will operate **only when the gear range selector is in the neutral position, 'N' on the gear range indicator, and the parking lamp switch is in the central position.**

To withdraw the key from the switch, turn it to the off position.

To facilitate use of the ignition key at night, the ignition switch can be illuminated by a lamp in the capping rail, directly above the ignition switch. To switch on the lamp, withdraw the knob of the main lighting switch to its fullest extent.

The ignition switch does not control the clock, interior lamps, luggage compartment lamp, bonnet lamp, electrically operated windows and the charging plug socket.

Ignition and master key

Two keys are provided with your car; one is the master key which has an octagonal shaped head and the other is the ignition key which has a round head.

The ignition key will switch on the ignition and operate the locks of the front doors only. The master key will switch on the ignition and operate all locks, therefore, the facia compartment and luggage compartment can be locked and if necessary, the ignition key may be left with the car when leaving your car in a garage.

Both keys are stamped with the same serial number. This number is not stamped on the locks, therefore, you are advised to note the number immediately you take delivery of your car in case the keys are mislaid.

Ignition warning lamp

The red warning lamp marked 'GEN' on the facia will be illuminated when the ignition switch is turned clockwise or anti-clockwise. When the engine is running, the light will be extinguished as the engine speed increases.

Instrument lamps

The instrument lamps are controlled by a switch on the facia marked 'PANEL' (see Fig. 3); the lamps will operate only when the main lighting switch is on.

The switch has two clockwise positions and the off position. The first clockwise position of the switch provides dim illumination of the instruments; the second clockwise position provides bright illumination.

Loudspeaker balance control

A balance control, on the left of the radio receiver varies the proportion of volume between the front and rear loudspeakers. The overall volume of sound is controlled from the receiver panel. The rear loudspeaker is mounted in the parcel shelf behind the rear seat.

Main lighting switch

The main lighting switch is situated above the ignition switch as shown in Figure 3; it is a rotary switch which has three positions clearly marked on the panel face as follows.

OFF . . .	All lamps off.
S & T . . .	Side and tail lamps on (headlamps also on dimmed dip beam when ignition is switched on if the dimmed system is fitted).
H, S & T . . .	Head, side and tail lamps on.
F, S & T . . .	Fog lamps, side and tail lamps on if fog lamps are fitted.

Oil pressure indicator

The instrument on the facia, marked 'OIL' indicates the oil pressure and operates only when the engine is running. Under normal operating conditions, the instrument needle should lie within the white band on the instrument scale, representing an oil pressure of approximately 40 lb/sq. in.

Oil pressure warning lamp

The amber warning lamp on the facia marked 'OIL' is illuminated when the ignition switch is turned clockwise. When the engine is started, the lamp will be extinguished as the oil pressure increases.

Parking lamp switch

The parking lamp switch on the facia (see Fig. 4) is marked 'right' and 'left'. Turn the main lighting switch to the 'S & T' position then turn the parking switch to either the position marked 'right' or 'left' as required; the side lamp and the tail lamp on the corresponding side of the car will remain illuminated. This system reduces the battery discharge when it is necessary to park with lights.

It is important to note that before driving the car, when lights are required, the parking lamp switch should be turned to the central position so that both side and tail lamps can be illuminated.

Rear window demister switch

The rear window demister is of the electric element type. To switch on the demister, press down the switch mounted on the facia adjacent to the steering column (see Fig. 4).

During the winter months, it is recommended that the switch remains in the on position, so that it will operate immediately the ignition is switched on. During the summer, or if not required, the switch should be turned off.

Speedometer

The speedometer has a dual scale which indicates the speed of the car in M.P.H. and K.P.H. and records also, both the total and the trip distance in either miles or kilometres, depending on the type of speedometer fitted. To return the trip reading to zero, turn the trip release clockwise (see Fig. 4).

Windscreen wipers and washer

A dual purpose switch on the facia (see Fig. 3), controls the windscreen wipers and the windscreen washer.

The windscreen wipers can be operated at either of two speeds. For wiping at normal speed, turn the switch knob clockwise to the first position. To increase the speed of the wipers, turn the switch to the second position.

Use the higher speed of wiping only during heavy rain; it should not be used during snow or with a dry or drying windscreen, i.e. when the load on the motor is high.

The wipers are self-parking when switched off. If the wiper motor continues to operate after being switched off, the parking position should be adjusted by a Retailer.

To operate the windscreen washer, press the knob of the wiper switch; release the knob and switch on the wipers to complete the cleaning. It should be noted that liquid will be sprayed onto the windscreen only while the switch is being pressed.

The liquid for windscreen washing is sprayed onto the windscreen within the traversing arc of the wipers by two jets on the scuttle.

As an optional extra, the washers may be operated automatically. In this case, press the knob of the wiper switch, then release it; this will cause the washer motor to spray fluid onto the windscreen until the secondary reservoir, within the main reservoir, is emptied; the motor will then switch off automatically. Use the wipers to complete the cleaning.

Warning lamp – hand brake/stop lamp bulb failure

If the ignition is switched on, the amber lamp on the facia warns the driver when the hand brake is applied. This lamp will warn the driver also when a stop lamp bulb has failed, if the foot brake is applied.

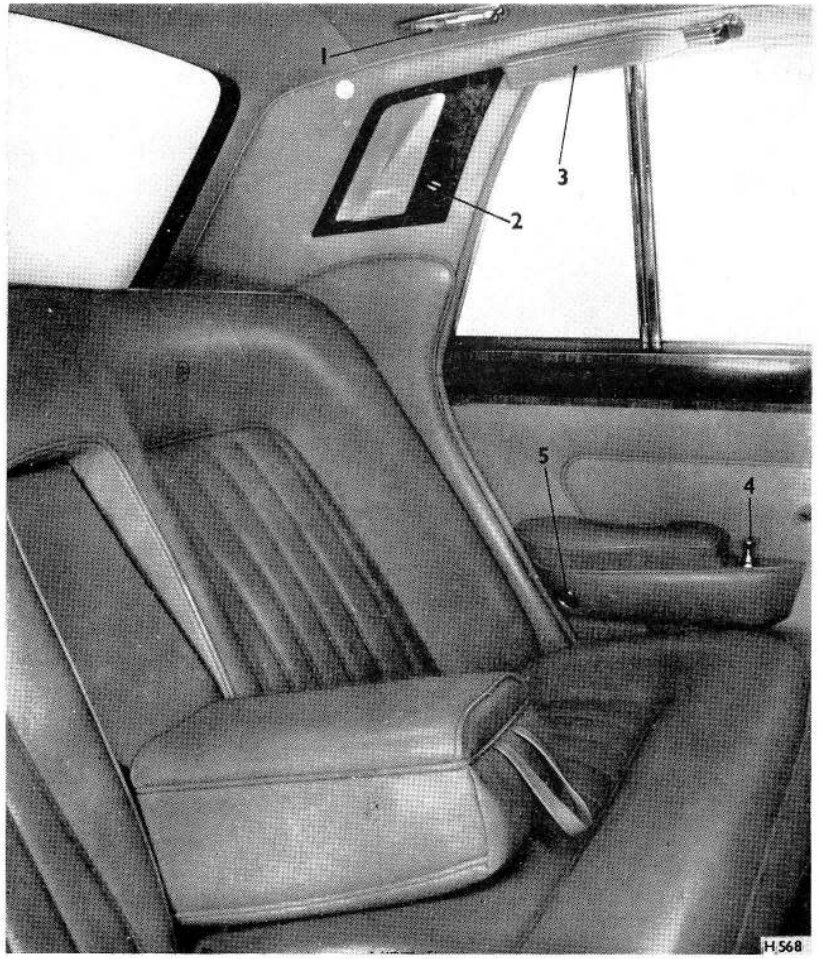


Fig 5 REAR COMPARTMENT FITTINGS

1 Reading/roof lamp
2 Switch for reading/roof lamp
3 Hand strap
4 Cigar lighter
5 Arm rest lamp

BODY FITTINGS AND ACCESSORIES

Arm rests

Adjustable arm rests are fitted to the front doors. To adjust the height of a rest, lift the release catch and move the arm rest to the desired position, then return the catch to the locked position. The arm rest can be adjusted fore and aft by moving it in the direction required; no release mechanism is fitted. A centre arm rest on the side of each front seat can be pulled down when required. The arm rest in the centre of the rear seats should be pulled down when required.

The arm rest fitted to each rear door contains an interior lamp and a cigar lighter; the arm rests are not adjustable.

Ash trays

Four ash trays are provided, one on each side of the facia (see Fig. 3) and one beneath each rear picnic table. The ash trays are opened for use by pulling the handle on those in the front compartment or by lightly pressing the catch on those in the rear. To empty a front ash tray, open the tray and press back the inner container until it is clear of the chrome retaining clip; the container can then be withdrawn.

To empty a rear ash tray, open to the full extent, lift the release catch on the right of the opening catch, then withdraw the tray from the spring-loaded hinge. Withdraw the tray in an upward direction, to avoid damaging the hinge.

Childproof locks

Childproof locks are a standard fitting on the rear doors and an optional extra on the front doors.

To operate the childproof locks, close the door and press down the lock control button. The interior remote control handle will not operate the door lock until such time as the lock control button is raised.

Cigar lighters

Three cigar lighters are normally provided, one on the facia and one in each arm rest on the rear doors. The lighter on the facia will be illuminated when the instrument lamps are switched on and the lighter is removed.

To use a lighter, push the knob fully in. When the element is heated sufficiently it will be partially ejected automatically.

Do not hold-in the lighter by hand as this will cause overheating of the element.

Door handles and locks

The door catches are controlled from outside the car by means of press buttons and from the inside by remote control handles. A lock control button is fitted on the top of each door sill.

The rear doors can be locked only by means of the lock control button.

Door handles and locks *(continued)*

The front doors can be locked either by the lock control button or by the private locks on the outside of each front door.

To eliminate the possibility of locking the doors with the keys on the inside, the door locks are self-cancelling and the act of closing a door will automatically unlock it. It should be noted that it is possible to lock a front door without using the key if the lock control button is pressed down and the door is closed with the push button on the exterior handle depressed; it is important to ensure that the keys are not left in the car. The rear doors may be locked in this manner also.

To lock the car when leaving from the right-hand front door, first lock the left-hand front door and the rear doors by pressing down the lock control buttons; lock the right-hand door from the outside by means of the private lock. When alighting from the left-hand side of the car, the procedure is reversed.

Fig 6 INTERIOR APPOINTMENTS

1 Grab handle
2 Remote control handle
3 Switch for electrically operated window
4 Lock control button
5 Ash tray
6 Picnic table

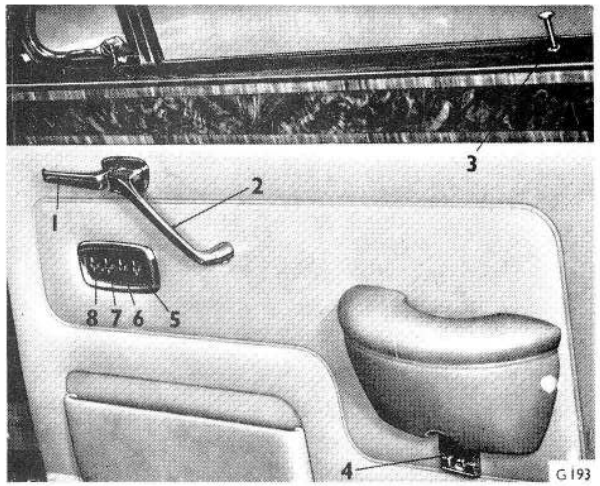


Fig 7 DRIVER'S DOOR

1 Remote control handle
2 Grab handle
3 Lock control button
4 Release catch
5 Switch for driver's window
6 Switch for front passenger's window
7 Switch for rear window – driver's side
8 Switch for rear window – front passenger's side

To lock the car by means of the private locks, turn the key toward the rear of the car; to unlock, turn the key toward the front of the car. To remove the key turn it to the centre position.

Electrically operated windows

The electrically operated windows are controlled by self-centring switches conveniently mounted on each door.

A single switch is mounted on each passenger's door (see Fig. 6) but the driver's door is provided with multiple switches (see Fig. 7) enabling the driver to operate all the car windows.

To lower a window, press the top of the switch button; to raise a window, press the underside of the switch button. Movement of the glass will cease immediately the switch is released, thus any desired window position may be obtained.

Facia compartment and map lamp

A compartment is provided in the facia, which can be locked with the master key. When the door of the compartment is closed, but not locked, it will be held in the closed position by a magnetic catch.

When opened fully, the door of the compartment serves as a picnic table. The lamp in the roof of the compartment illuminates the interior and can be used as a map lamp also. The lamp is independent of the instrument lamps circuit and it will be switched off automatically when the door of the compartment is closed.

Front seat controls

The front seats are electrically operated and may be moved forward or rearward and may be raised or lowered. The seats may be tilted also by raising or lowering the front or rear of the seat base. The front seats are controlled for movement by two switches mounted between the seats (see Fig. 8); each switch has eight positions. It is necessary to switch on the ignition before the seat switches can be operated.

To adjust the seat to the required position, move the lever in the same direction, e.g. to move the seat forward, move the lever forward; movement of the seat will cease when the lever is released. The intermediate positions of the switch lever, between horizontal and vertical positions, move either the front or rear of the seat up or down, e.g. if the switch lever is moved to the intermediate position between the forward and vertical positions, the front of the seat will be raised. The switch positions and the effect produced are shown in Figure 8.

The back of each front seat is manually adjusted for rake by means of a control handle fitted to the rear outer edge of each seat. Lift up the control handle to release the locking mechanism, then adjust the seat back as desired. Release the control handle to lock the mechanism.

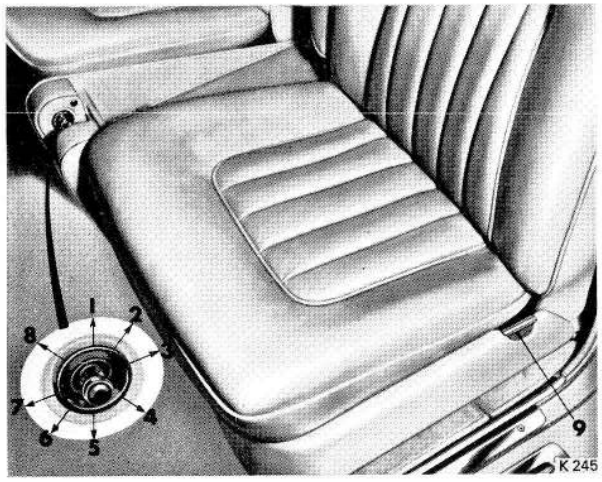


Fig 8 FRONT SEAT ADJUSTMENT

1 Seat up
2 Rear of seat up
3 Seat rearward
4 Rear of seat down
5 Seat down
6 Front of seat down
7 Seat forward
8 Front of seat up
9 Lever for rake adjustment

Interior lamps

Four interior lamps are mounted in the roof and one in each arm rest on the rear doors. The arm rest lamps are a combination lamp showing a red lens to the rear and a white lens to the floor. The front interior lamps and the arm rest lamps are switched on and off automatically as a door is opened or closed. In addition, the roof lamps can be manually controlled.

The front two roof lamps are controlled by individual switches on the facia (see Fig. 3); the switch on the right of the facia controls the right-hand lamp and the switch on the left controls the left-hand lamp.

The rear roof lamps are controlled by the three way switch in each rear quarter companion; move the switch down for general lighting and up for reading.

Luggage compartment

To open the lid of the luggage compartment press the button in the centre of the double handle below the number plate and raise the lid; the lid is counterbalanced to maintain it in the raised position. The interior of the compartment will be illuminated by a lamp on the underside of the lid, when the lid is raised.

The lid can be locked in the closed position with the master key.

A charging plug socket is provided in the luggage compartment on the left-hand side of the car (see Fig. 9); this enables the battery to be charged whilst in position. To ensure that the current direction is correct, the terminals are marked '+' and '−' and in addition, are of different sizes to indicate the plug fitting. A charging plug to fit the socket is supplied and is located in the small tools tray on top of the battery.

Occasional seat/stowage compartment

A small stowage compartment is positioned between the two front seats for the stowage of small articles. The base of this stowage compartment is padded and upholstered in the same material as the seats and can be raised to form an occasional seat when it is necessary to carry three people in the front compartment of the car. To raise the base, lift the strap until the base is clear of its recess then lower the base.

To convert to the stowage compartment, lift the strap then pull back the base until it is clear of its locating ledge then lower the base.

Picnic tables

A picnic table is fitted into the back of each front seat; pull the handle outward and down when a table is required for use.

The door of the facia compartment may be used as a picnic table also when the door is lowered.

Safety belts and anchorages

On cars destined for the United Kingdom, lap and diagonal inertia reel safety belts are fitted to the front compartment; on these cars also, safety belt anchorages only are fitted to the rear compartment.

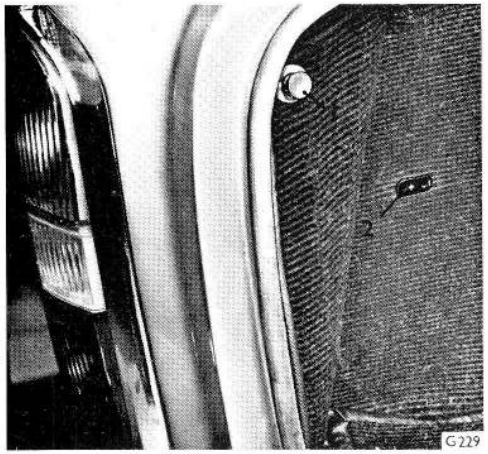


Fig 9 CHARGING PLUG SOCKET

1 Securing press stud **2** Charging plug socket

To fasten an inertia reel belt, pull the clip on the belt adjacent to the door pillar across the body and down towards the waist, push the clip into the safety clasp until firmly secured. To release, lift up the safety clasp; the clip and belt will return automatically to the stowage position on the door pillar.

To check that the inertia reel safety belts are operating satisfactorily, select an open stretch of road, then when the road is free from any potential danger, accelerate the car to 15 m.p.h. and brake sharply from this speed. The belts should be sensitive to fierce car braking and hard cornering but they should not lock by pulling or jerking using hand pressure.

On cars destined for countries other than the United Kingdom, safety belt anchorages only are fitted, the tapped holes being blanked off with anchorage bolts; the anchorages are positioned four behind the front seats, one in each centre door pillar, four in the rear seat pan and two in the rear parcel shelf. The anchorages provide for the fitting of lap and diagonal safety belts to the front compartment and either lap and diagonal or lap only safety belts to the rear compartment. If, required, your Retailer will provide and fit the approved safety belt kits.

Should a seat belt be subjected to stress arising from a severe accident, the belt assembly should be discarded and a new one fitted. The mounting points should also be carefully inspected. Only safety belts approved by Rolls-Royce Ltd. should be fitted.

Sun visors

Two sun visors are provided, both being adjustable for angle and position; they can be moved to the side windows if desired. The passenger's visor has a mirror on the back.

As a safety precaution, the sun visors are designed so that they will collapse if one's head comes into sharp contact with them.

DRIVING THE CAR

STARTING THE ENGINE

Fully depress and then release the accelerator pedal. This will allow the fast idle cam on the carburetter controls to position itself in relation to the engine temperature and thus set the throttle to the correct opening for starting.

Move the gear range selector lever to Neutral, indicator position 'N'. The engine cannot be started unless the selector lever is in the neutral position. A safety device is provided which prevents the starter motor being operated if a gear is selected.

It is essential that the hand brake be applied before starting the engine. Upon initial starting from cold, the automatic choke system will cause the engine to run at a fairly fast idling speed and, if the hand brake is not firmly applied, the car may move, immediately a gear is selected.

Switch on the ignition by turning the key clockwise to the first position.

Operate the starter motor by turning the ignition key further clockwise; release the key immediately the engine starts to allow the switch to return to the ignition position assisted by spring pressure.

If the engine is allowed to warm-up before driving the car, the accelerator pedal should be lightly depressed then released after a few minutes running; the engine speed will again be adjusted, relative to the engine temperature, by the reduction of the throttle opening.

GEARBOX OPERATION

The automatic gearbox is more than just a mechanism which automatically selects gear ratios according to conditions of speed and load. An over-riding control is provided which enables the driver to exercise his own judgement with regard to the gear ratios to be selected, therefore, an understanding of what is possible greatly enhances the pleasure to be derived from driving the car.

No automatic mechanism has the power of anticipation, but the driver can see ahead and has the means of over-riding the automatic mechanism.

The gearbox provides four forward ratios, also Neutral and Reverse. The gear range indicator on the centre of the steering column is marked 'R N 4 3 2'. The indicator needle and gear selection are controlled by the selector switch

Gearbox operation *(continued)*

on the right of the steering column (see Fig. 4). When the switch is moved to select a gear range, provided that the ignition is switched on, it causes an electrically operated actuator mounted on the gearbox rear extension to operate; the actuator is connected by a lever to the gearbox quadrant and moves the quadrant to the required gear range position. From the neutral position, the selector lever is moved up one position for Reverse and down one position for '4' range.

Although the selector switch may be moved, the electrically operated actuator will not operate until the ignition is switched on, except in the case of reverse gear. When the selector switch is moved to the reverse gear position, with the ignition switched off, the electrically operated actuator will operate, reverse gear will be selected and the parking pawl will be engaged; the parking pawl will then remain engaged even if the selector switch is moved from the reverse position, until such time as the ignition is switched on.

Fig 10 MANUAL SELECTION OF GEAR RANGES

1 Tommy bar
2 Rear band adjusting screw
3 Sealing cover

The gears obtainable in each range are as follows:

'4' – 1st, 2nd, 3rd and 4th.
'3' – 1st, 2nd and 3rd (with safety change to 4th).
'2' – 2nd; 1st gear obtainable should the speed and load on the engine require it (no safety change in '2' range).
'R' – Reverse with engine running. Reverse and parking pawl engaged with engine stationary.

To ensure that the car is not made immobile through unlikely failure of the electrically operated gearchange selector mechanism, a device is provided to enable the gearbox selector mechanism to be operated manually; this device is for emergency use only, and a Retailer should be consulted as soon as possible to remedy the cause of failure. Before using this device, first open the fuse box and press the red button on the gearbox thermo cut-out and check if the selector switch will operate the gearbox selector mechanism. This cut-out is fitted to safeguard the gearbox actuator and electrical circuit from overheating due to failure of a component.

If it is necessary to use this device, lift up the carpet over the centre tunnel and remove the rectangular rubber seal from the floor over the gearbox selector mechanism (see Fig. 10). Fit the small diameter end of the wheelbrace tommy bar into the boss on the selector lever; this tommy bar is fitted in the tool stowage bag attached to the right-hand side of the luggage compartment.

As it is necessary to obtain neutral gear before the engine can be started, move the tommy bar to its most rearward position. Start the engine, then move the tommy bar forward until the first notch on the gearbox quadrant is located; this is range '4'. The car can then be driven normally as the gear changes will take place automatically without having to move the tommy bar from this position. If it is necessary to select reverse gear, stop the car then move the tommy bar to its most forward position. It should be noted that the gear positions do not correspond to the gear positions marked on the indicator on the top of the steering column. From the most rearward position of the tommy bar (Neutral position) the gears are '4, 3, 2, R'.

Driving technique

If the driver so desires, he can allow the gearbox to make changes which will occur automatically at the theoretically correct moment in terms of speed and load. However, road or traffic conditions may be such that the theoretically correct moment of gear change may be undesirable, or may be unexpected or even perhaps delayed. It is for this reason that the over-riding controls are provided, enabling the driver to enforce a gear change whenever he so desires.

The driver should first familiarize himself with the approximate speeds at which the automatic changes occur; with the selector lever in '4' range these are as follows:

Driving technique *(continued)*

Gears	1 – 2	2 – 3	3 – 4
Light throttle	5 m.p.h.	14 m.p.h.	23 m.p.h.
Full throttle	18 m.p.h.	33 m.p.h.	75 m.p.h.

It will be noted that greater throttle openings cause the changes to be progressively delayed, therefore, an up-change can be induced by the driver at any speed within these limits by reducing the pressure on the throttle pedal at the appropriate moment. A safety up-change to fourth gear is incorporated in range '3' to avoid overreving the engine.

The driver, who occasionally wishes to indulge in a very fast get-away, will obtain maximum acceleration by allowing the automatic gearbox to make full throttle changes throughout the speed range.

In traffic, when it is necessary to maintain speeds between 5 m.p.h. and 23 m.p.h. for some time, the driver can avoid the continual changes which might occur between gears three and four by placing the selector lever in '3' range. Similarly, in traffic which enforces an even slower rate of progress, the selector lever can be placed in '2' range, and so avoid undesirable changes to and from the higher ratios.

For normal cruising on the open road, the selector lever should be left in '4' range, but the driver will discover that smooth and satisfying changes between fourth gear and third gear can be made with extreme ease and rapidity by moving the selector lever between range '4' and '3'. Completely imperceptible changes can be made if the throttle is at the same time correspondingly adjusted, the smoothest changes occuring at light throttle openings. The driver is encouraged to make the fullest use of this gear change in exactly the same way as he would with a non-automatic gearbox. Overtaking other traffic can be accomplished at the desired throttle opening with ease.

For full throttle acceleration in an emergency, the driver can immediately obtain a lower gear by pressing the accelerator pedal hard down onto its spring-loaded stop. This is known as 'kick-down'. Full throttle down-changes are not usually required except for maximum acceleration and the driver will, in most cases, prefer to make full use of the selector lever.

When a refrigeration system is fitted, **it is most important that Neutral be selected when the engine must be idled for long periods during hot weather.** Under these conditions, the engine idling speed is increased to ensure efficient cooling of the engine and improved operation of the refrigeration system.

Second gear control

Sometimes, it may be necessary to hold the car indefinitely in second gear, for example, when negotiating very steep gradients. When '2' range is selected with the car stationary, the car will start from rest in second gear and will stay in second gear until the selector lever is moved to a higher range. However, the gearbox will change down automatically if first gear is required due to extreme loading on the engine. '2' range is useful

also, when descending very steep hills and it is desired to use the engine as a brake.

It must be remembered that in fixed second it is possible to 'over-rev' the engine if a speed of 42 m.p.h. is exceeded, as in this range there is no safety up-change.

Manoeuvring

The fluid coupling and gear ratios of First and Reverse may sometimes make it a little difficult to judge precisely the correct engine speed required to move the car a few inches. It will be found that manoeuvring in confined spaces is more easily accomplished if a little resistance is applied by light application of the hand brake; this is most important if the engine has just been started from cold and is on fast idle.

Parking procedure

As a safety feature, the car is fitted with two methods for holding it stationary when parking. **It is important to note that both methods should always be used.**

The first method is the hand brake which, by mechanical linkage, operates two brake pads on each rear wheel disc. To apply the hand brake the handle should be pulled towards the driver; to release the brakes, turn the handle clockwise and depress it.

The second method is incorporated into the gearbox and operates whenever the gear range selector lever is moved to the 'R' Reverse position with the car stationary and the ignition switched off. When this position is selected a parking pawl engages the gearbox output shaft and prevents it from turning.

As an additional safety measure when parking on an incline it is always advisable to turn the front wheels towards the kerb.

Before starting the engine it is essential that the brakes be firmly applied. The engine will not start until the selector lever is moved to the neutral position, 'N' on the gear position indicator and the ignition is switched on; no parking lock will then be available.

Towing the car

The car must not be towed if any mechanical damage to the transmission components is suspected or if the gearbox oil level is low.

Should it be necessary to tow the car for any distance due to mechanical failure other than transmission failure, the gearbox should be prepared for towing by slackening the rear band adjusting screw 4½ turns and locking the adjusting screw lock-nut.

To gain access to the adjusting screw, lift up the carpet over the centre tunnel and remove the rectangular rubber seal shown in Figure 10. **When towing under these conditions, always ensure that the gearbox is in the neutral position and that a speed of 25 m.p.h. is not exceeded.**

Coasting

Coasting must be avoided at all times, otherwise the gearbox may suffer serious damage due to lack of lubrication.

Tool storage

An adequate set of tools is supplied with the car. The heavy tools are fitted in the tool stowage bag which is secured to the right-hand side of the luggage compartment. The small tools are contained in a tool box mounted on top of the battery cover on the left-side of the luggage compartment.

The tool stowage bag contains the jack, a tommy bar and a box spanner.

The tommy bar, in addition to its use with the box spanner can be used also to remove the wheel discs and to operate the gearbox selector mechanism if manual operation ever becomes necessary.

The box spanner fits the wheel nuts, the bolt securing the spare wheel platform and the sparking plugs.

To remove the stowage bag, release the securing strap and then lift the bag clear of the support brackets.

To gain access to the small tools, remove the trim from around the battery; the trim is secured by press stud clips. Place the fingers into the finger groove beneath the tool tray and slide the tray toward the right-hand side of the luggage compartment until it clears the slides. The lid of the tool box can then be lifted off.

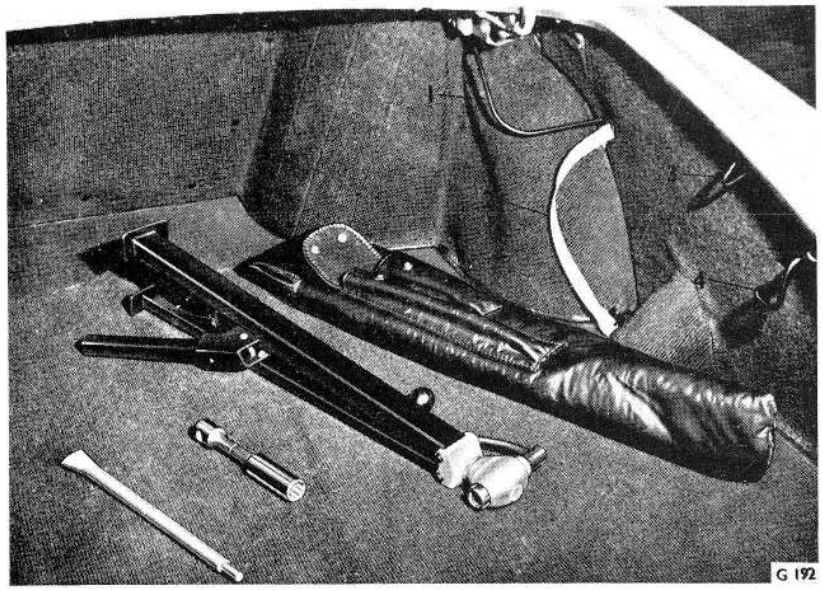


Fig 11 HEAVY TOOLS AND STOWAGE BAG

1 Stowage bag front support
2 Securing strap
3 Strap fastening point
4 Stowage bag rear support

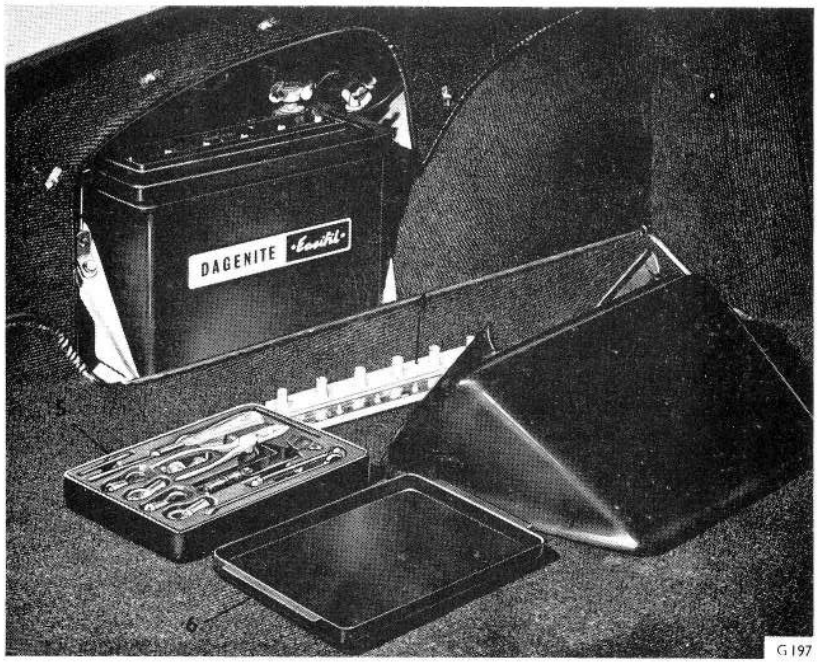


Fig 12 ACCESS TO THE SMALL TOOLS AND THE BATTERY

1 Securing bolt
2 Securing bolt
3 Battery cover
4 Filling trough cover
5 Tool tray
6 Tool tray lid

The small tools tray contains the following tools:

Holder containing two feeler gauges, a 0.015 in. feeler gauge for setting the distributor points and a 0.025 in. feeler gauge for setting the sparking plug points.

Adjustable spanner.

Screwdriver with three interchangeable end pieces secreted in the hollow handle; to obtain the end pieces, unscrew the cap on the end of the handle.

$\frac{5}{16}$ in. U.N.F. open end/ring spanner.

Hexagonal adaptor to fit the engine sump drain plug, the gearbox sump drain plug and the final drive unit level and drain plugs.

2 B.A. Allen key to fit the screw securing the radiator mascot.

Pair of pliers.

Tyre pressure gauge.

Two flasher lamp bulbs.

Two stop/tail lamp bulbs.

Two side lamp bulbs.

Charging plug.

Spare wheel

The spare wheel is mounted on a hinged platform beneath the floor of the luggage compartment on the left-hand side.

The spare wheel can be inflated without removing it from its platform by lifting the carpet from the floor of the luggage compartment and removing the rubber cover shown in Figure 13. Always ensure when fitting the spare wheel onto its platform that the tyre valve is aligned with the access hole in the floor of the luggage compartment.

To remove the spare wheel, open the lid of the luggage compartment to gain access to the bolt which secures the spare wheel platform; this bolt is positioned at the rear of the luggage compartment floor and approximately on the car centre line (see Fig. 13). To lower the platform, turn the bolt anti-clockwise using the box spanner and tommy bar provided in the tool kit; lower the platform until the spare wheel can be removed.

The jacking system

The jacking system provided, enables the jack to be placed in a convenient position with minimum effort and without the necessity of working beneath the car (see Fig. 14).

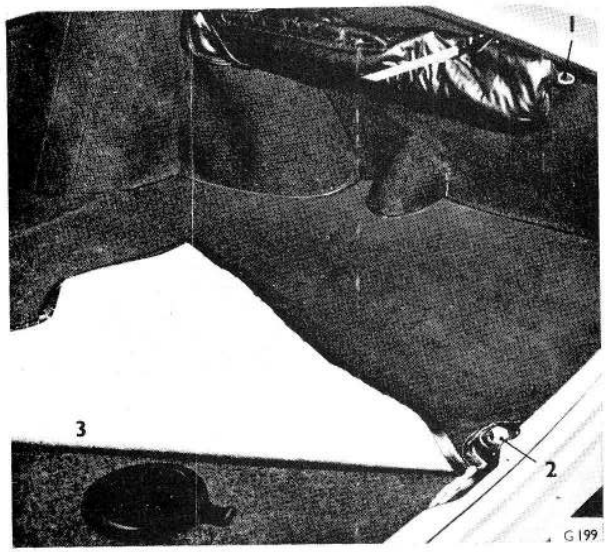


Fig 13 SPARE TYRE INFLATION TRAP

1 Manual release for fuel filler door
2 Lowering bolt for spare wheel platform
3 Rubber cover for inflation trap

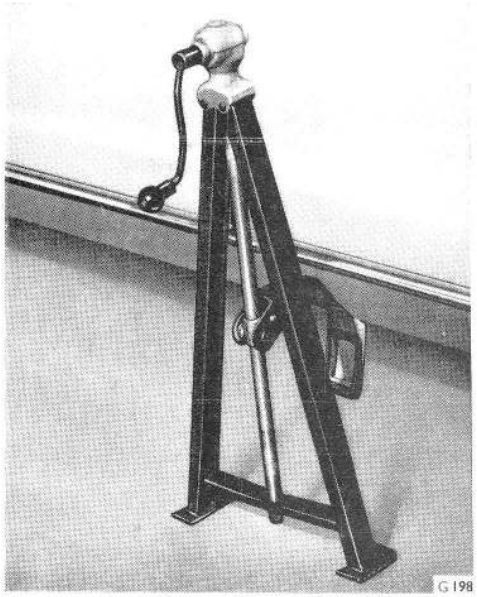


Fig 14 THE JACK IN POSITION

On each side of the car, a hollow jacking bracket is fitted to the underbody and access is gained by opening the cover plate in the sill; each cover plate is positioned to the front of the centre body pillar.

To raise one side of the car, ensure that the car is standing on a fairly level surface and that the hand brake is applied firmly.

The cover plate in the sill is hinged at the lower end and may be opened by levering at the top edge.

The jack is located in the tool stowage bag fitted to the right-hand side of the luggage compartment (see Fig 11); to remove the bag, release the securing strap and lift the bag clear of the support brackets.

Adjust the jack spigot to a convenient height for normal use then press the spigot well home into the bracket; open the jack legs and set them squarely on the ground (see Fig. 14) then press the top of the jack toward the car. Operate the handle until the road wheels are clear of the ground. To lower the car, reverse the procedure.

If it is necessary to raise the car by means other than those supplied, suitable jacking points are as follows:

Front – The front pivot mounting for the lower triangle levers on the sub-frame.

Rear - The centre of the final drive casing or the rear suspension cross-member.

Wheel changing

Changing a wheel should present no difficulties as the spare wheel can be fitted either to a front or rear hub as follows.

Remove the wheel disc (see Fig. 38) using the tommy bar provided, noting that the three most suitable positions for removing a disc are shown in Figure 38; slacken the five wheel retaining nuts using the box spanner and tommy bar provided in the tool stowage bag. Nuts on the left-hand wheels have left-hand threads and the nuts on the right-hand wheels have right-hand threads.

Jack up the car as described in 'The jacking system', then fully unscrew the wheel nuts and remove the wheel.

Remove the spare wheel as previously described (see 'Spare wheel').

Fit the spare wheel and screw on the wheel nuts until they just 'nip', then lower the car until the tyre touches the ground; fully tighten the nuts.

Lower the car completely and remove the jack.

Fit the wheel disc, ensuring that the hole for the tyre valve is correctly aligned.

LUBRICATION AND MAINTENANCE

Periodic lubrication and maintenance

In the following text, schedules are referred to as 'ESSENTIAL MAINTENANCE' and 'PREVENTIVE MAINTENANCE'.

The 'ESSENTIAL MAINTENANCE' schedules are the minimum maintenance requirements to comply with the Warranty and must be carried out by your Retailer at the periods specified.

The 'PREVENTIVE MAINTENANCE' schedules, although important, will be carried out at your request only and you should be advised by your Retailer as to the schedules best suited to meet your individual requirements and driving conditions.

At the end of this Chapter is a table of approved lubricants.

ESSENTIAL MAINTENANCE

These essential schedules are the minimum maintenance requirements to comply with the Warranty and must be carried out by your Retailer at the periods specified.

INITIAL SERVICE

This service should be carried out by your Retailer after the first 3,000 miles (5,000 km.) or 3 months whichever is the earlier.

Automatic gearbox

Check the fluid level and top-up if necessary (see Page 79).

Engine

Change the engine oil (see Page 63).

Engine cooling system

Tighten the worm drive clips of all coolant hoses.

EVERY 3,000 MILES (5000 KM.) OR 3 MONTHS WHICHEVER IS THE EARLIER

If the car is used for constant stop start operation renew the engine oil.

EVERY 6,000 MILES (10000 KM.) OR 6 MONTHS WHICHEVER IS THE EARLIER

Automatic gearbox
Check the fluid level and top-up if necessary (see Page 79).

Engine
Change the engine oil and renew the oil filter element (see Page 63).

EVERY 12,000 MILES (20000 KM.) OR 12 MONTHS WHICHEVER IS THE EARLIER
In addition to the 6,000 mile (10000 km.) 6 monthly essential schedule, carry out the following.

Air silencer
Remove and clean the wire mesh filter elements (if fitted) (see Page 78). Renew the paper filter elements (if fitted) (see Page 77).

Automatic gearbox
Drain the gearbox sump and fluid coupling and fill with an approved fluid (see Pages 58 and 80).

Final drive unit
Check the oil level and if necessary top-up with an approved oil (see Page 81) to the level plug orifice; fit the level plug using a new washer.

Steering mechanism
Lubricate the six grease nipples on the track rods and steering lever ball joints with the approved grease (see Fig. 35).

EVERY 24,000 MILES (40000 KM.) OR 2 YEARS WHICHEVER IS THE EARLIER
In addition to the 6,000 mile (10000 km.) 6 monthly and the 12,000 mile (20000 km.) 12 monthly essential schedules, carry out the following.

Engine
Remove and clean the flame traps in the crankcase breather tube (see Page 66).

Final drive unit
Drain when warm and fill with the approved oil (see Pages 58 and 81).

PREVENTIVE MAINTENANCE

The following schedules, although important, will be carried out at your request only and you should be advised by your Retailer as to the schedules best suited to meet your individual requirements and driving conditions.

INITIAL SERVICE
This service should be carried out by your Retailer after the first 3,000 miles (5000 km.) or 3 months whichever is the earlier.

Automatic height control system
Check that the automatic levelling system is operating satisfactorily.

Belt tension
Check the tension of the belts driving the following:

Fan and steering pump, generator or alternator and refrigeration compressor (if fitted). Adjust the belt tension if necessary (see Page 69).

Steering pump
Check the oil level in the reservoir; top-up if necessary (see Page 95).

Test
Road test the car.

EVERY 6,000 MILES (10000 KM.) OR 6 MONTHS WHICHEVER IS THE EARLIER
In addition to the regular maintenance carry out the following.

Air silencer
Remove and clean the wire mesh filter elements (if fitted) (see Page 78).

Belt tension
Check the tension of the belts driving the following:

Fan and steering pump, generator or alternator and refrigeration compressor (if fitted). Adjust the belt tension if necessary (see Page 69).

Brakes
Inspect for wear the brake lining pads, including the hand brake pads; the face of a pad should not be less than $\frac{1}{16}$ in. from the bonded steel backing plate. When renewing brake pads, examine the condition of the dust excluders on the calipers and renew as necessary.

Carburetters
Clean the air valves in the carburetters. Check the oil level in the air valve dampers and if necessary, top-up to the correct level (see page 74).

Control linkages
Apply a few drops of oil to the gear range selector linkages adjacent to the gearbox and also to the accelerator linkage. Do not lubricate the fast idle cam.

Electrical system
Check that all lights, direction indicators and instruments are operating satisfactorily.

Fuel pumps
Check the functioning of the fuel pumps. Disconnect in turn the electrical leads and check each pump independently.

Hand brake linkage
Lubricate the hand brake linkage pivot points (see Page 93). Also, lubricate the inner hand brake cable where it passes over the pulleys (see Page 93).

Heating and ventilation system
Check that all the controls for the heating and ventilation systems are operating satisfactorily.

Ignition distributor
Remove the rotor arm. Inject two or three drops of clean engine oil into the distributor spindle (see Page 111).

Inject a few drops of thin machine oil through the hole in the contact breaker base plate to lubricate the automatic advance mechanism and shaft bearings. Lightly smear with Midlands Silicones No. 4 grease the contact breaker operating cam.

Clean the contact breaker points and check the gaps (see Page 111).

Check and, if necessary, re-set the ignition timing (see Page 112).

Propeller shaft
Examine the neoprene seal at the front end of the shaft for serviceability.

Rear wheel drive-shafts
Examine the condition of the neoprene seal covering each ball and trunnion joint for any signs of oil leaks.

Refrigeration system (if fitted)
Examine the condenser matrix and remove from its external surface any foreign matter such as flies, insects etc.

Check that the controls are operating satisfactorily.

Sparking plugs
Clean and test the plugs. Set the gaps to between 0·023 in. and 0·028 in. (see Page 112).

Steering pump
Check for leaks. If necessary, top-up the level of oil in the steering pump reservoir (see Page 95).

Wheels and tyres
Check and, if necessary, balance the wheels (see Page 102).

Lightly smear with grease the lowering bolt and hinges of the spare wheel platform.

Test
Road test the car.

EVERY 12,000 MILES (20000 KM.) OR 12 MONTHS WHICHEVER IS THE EARLIER
In addition to the regular maintenance and the 6,000 mile (10000 km.) 6 monthly preventive schedules carry out the following.

Automatic height control system
Disconnect the ball joints on each height control valve operating rod, clean the joints and smear with grease (see Page 99), then reconnect the ball joints. Ensure that the length of each operating rod is not altered.

Check that the levelling system is operating satisfactorily.

Check the levelled height and re-set if necessary.

Battery
Clean the battery terminals and apply a coating of petroleum jelly.

Heating and ventilation system
Renew the filter beneath the scuttle air intake grille (see Page 133).

Shock dampers
Examine the external condition of the dampers and renew the dampers if they show signs of oil leakage.

Sparking plugs
Renew the plugs and set the gaps to between 0·023 in. and 0·028 in. (see Page 112).

Steering idler box damper
Check for signs of oil leakage; if apparent, inspect the oil level and, if necessary, top-up to the correct level (see Page 96).

EVERY 24,000 MILES (40000 KM.) OR 2 YEARS WHICHEVER IS THE EARLIER
In addition to the regular maintenance, the 6,000 mile (10000 km.) 6 monthly and the 12,000 mile (20000 km.) 12 monthly preventive schedules, carry out the following:

Alternator (if fitted)
Check the slip rings and the brushes for wear; also check the brushes for freedom in their holders (see Page 107).

Crankcase breather
Remove and clean the flame traps in the crankcase breather tube and also clean the plug in the choke butterfly housing.

Fuel pumps
The fuel pump unit should be removed from the car and checked for pumping efficiency. If necessary the pump unit should be renewed.

Hand brake pulleys

Remove the plastic plugs fitted to the lower two hand brake pulleys, pack the internal cavities of the pulleys with the approved grease, fit new plugs and remove the heads. If plastic plugs are not fitted it will be necessary to dismantle the pulleys to pack with grease.

Generator (if fitted)

Inspect the commutator and the brushes for wear; also check the brushes for freedom in their holders (see Page 106).

Rear wheel drive-shafts

Lubricate the grease nipple on each drive-shaft outer universal joint with the approved grease.

Propeller shaft

Examine the rear joint for signs of grease leakage. Check the torque tightness of the bolts securing the front and rear joints.

Steering pump

Renew the filter element in the steering pump reservoir (see Page 95).

EVERY 48,000 MILES (80000 KM.) OR 4 YEARS WHICHEVER IS THE EARLIER

In addition to the regular maintenance, the 6,000 mile (10000 km.) 6 monthly, the 12,000 mile (20000 km.) 12 monthly and the 24,000 mile (40000 km.) 2 yearly preventive schedules, carry out the following.

Rear fuel filter

The filter element should be renewed and the filter bowl cleaned (see Page 72).

SEASONAL SCHEDULE EVERY 12 MONTHS

Engine cooling system

Drain the coolant from the radiator and engine crankcase. This should be carried out just prior to the autumn (in the U.K. prior to September 21st).

Fill the system with the correct anti-freeze or inhibited solution (see Page 68).

Refrigeration system (if fitted)

These operations should be carried out only by an experienced refrigeration engineer.

Check that the refrigeration system is functioning correctly. If necessary, top-up the system with refrigerant. If loss of refrigerant is evident, check the system for leaks.

Check the oil level in the refrigerant compressor.

EVERY 2 YEARS

In addition to the 12 monthly schedule, carry out the following:

Engine cooling system

Drain the coolant from the radiator and engine crankcase. Thoroughly reverse flush the coolant passages with a continuous flow of water. Change the hoses when necessary.

Fill the system with the correct anti-freeze or inhibited solution (see Page 68).

SPECIAL PRECAUTIONS

Should the car be used in very cold temperatures, drain the engine sump when thoroughly warm and also drain the carburetter air valve dampers.

The engine sump and the carburetter air valve dampers should then be filled with oil having the following viscosity.

For constant temperatures of between 32°F. and −10°F. (0°C. and −23°C.) use 10W/30 grade oil.

For constant temperatures of −10°F. (−23°C.) and below use 5W/20 grade oil.

SERVICE RECOMMENDATIONS

The following operations may be carried out at the brake pad renewal nearest to the mileage specified.

Under normal motoring conditions it is recommended that the following servicing is carried out at 60,000 miles.

Renew the flexible hoses to the braking systems and automatic levelling system with the exception of the hoses connecting the brake pumps to the accumulators, the hoses connecting the accumulators to the frame connector block and the low pressure return hoses from the automatic levelling system; each of the low pressure return hoses is marked with a white identification sleeve. At this mileage also, renew the disc brake caliper seals and the deceleration conscious pressure limiting valve seals; completely drain the fluid from the hydraulic circuits and then fill with new fluid and bleed the circuits. Renew the master cylinder seals and bleed the circuit.

It is emphasised that the service recommendations are not normal servicing arrangements and will be carried out only at the Owner's request.

REGULAR MAINTENANCE

In addition to all other schedules, the following items should be checked by the Owner or Retailer at the periods specified.

Battery

Every week, check the level of the electrolyte in the battery; if necessary top-up with distilled water. During hot weather or when long distances are covered, check the battery more frequently.

Periodically, check that the battery box breather pipe is not obstructed.

APPROVED LUBRICANTS

	B.P.	CASTROL	ESSO	MOBIL	SHELL
Engine—Multi-grade	Visco-static Visco-static Longlife	Castrolite	Esso Extra Motor Oil Esso Motor Oil 20W/30	Mobiloil Special 10W/30 Mobiloil Special 20W/40	Shell Super Oil
Summer	Energol SAE 30	Castrol XL	—	Mobiloil A	Shell X-100 30
Winter	Energol SAE 20W	Castrolite	—	Mobiloil Arctic	Shell X-100 20W
Carburetter Dampers, Hand Oiling Points	Energol SAE 20W	Castrolite	Esso Extra Motor Oil	Mobiloil Arctic	Shell X-100 20W
*Automatic Gearbox, Steering Idler Box Damper	Automatic Transmission Fluid (Type A Suffix A)	Castrol TQ 2418A	Esso Automatic Transmission Fluid (Type A Suffix A)	Mobil ATF 200	Donax T6 2416A
Steering Pump	—	Castrol TQ 2418A	—	—	Donax T6 2416A
Final Drive Unit, Drive-Shaft Ball and Trunnion Joints	Gear Oil SAE 90EP	Castrol Hypoy 90EP or Castrol Hi-press S/C	Esso Gear Oil GP 90/140	Mobilube GX 90	Spirax 90 EP
Front and Rear Hubs, Steering Idler Box Housing, Drive-Shaft Outer Universal Joint	Energrease L2	Castrolease LM	Esso Multi-purpose Grease H	Mobilgrease MP	+Retinax A
Distributor Cam	Midlands Silicones No. 4 Grease				
Height Control Valve Operating Rod Ball Joints, Steering Joints, Hand Brake Inner Cable, Hand Brake Linkage Clevis and Fulcrum Pins and Hand Brake Pulleys	Rocol MT 265				
Refrigeration Compressor	Frigidaire 525				
Hydraulic Brakes and Automatic Height Control System	Castrol-Girling Amber Brake Fluid 1738				

\+ First preference.

* Also approved: General Motors – Hydramatic Fluid Type AQ ATF.

Carburetters

Monthly, check the oil level in the reservoirs of the automatic air valve dampers; top-up if necessary (see Page 74).

Engine

Weekly or every 500 miles (800 km.), whichever is the earlier, check the oil level by means of the dipstick; top-up if necessary (see Page 61).

Headlamp alignment

Periodically, the headlamp beam alignment should be checked using specialised beam setting equipment; the engine must be running when these operations are carried out.

Hydraulic reservoirs

Monthly, check the level of fluid in the reservoirs for the braking and automatic height control systems; the engine should be run for 4 minutes before checking the fluid level (see Page 92). Top-up if necessary to the indicated level. If frequent topping-up is necessary check the hydraulic systems for leaks.

Radiator

Every 3 months, check the coolant level in the radiator header tank; if necessary, top-up with the correct anti-freeze or inhibited solution (see Page 66).

Tyres

Check the tyre pressures regularly (see Page 101).

Windscreen washer

Top-up the reservoir as necessary (see Page 125).

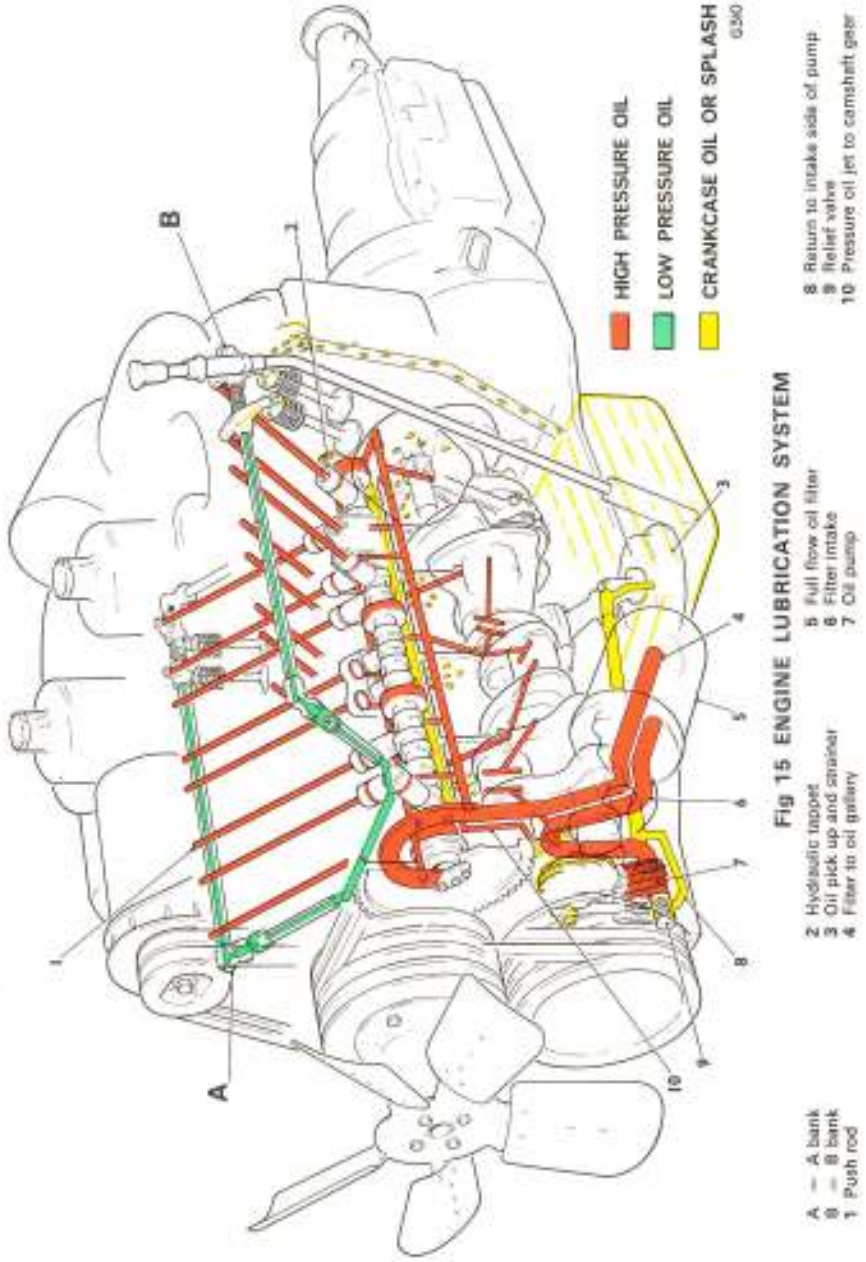


Fig 15 ENGINE LUBRICATION SYSTEM

A = A bank
B = B bank
1 Push rod
2 Hydraulic tappet
3 Oil pick up and strainer
4 Filter to oil gallery
5 Full flow oil filter
6 Filter intake
7 Oil pump
8 Return to intake side of pump
9 Relief valve
10 Pressure oil jet to camshaft gear

ENGINE

The engine has eight cylinders arranged in two banks of four, each bank being inclined at 90° to the other. The crankcase and detachable cylinder heads are of cast aluminium alloy.

The crankshaft is dynamically balanced and is carried in five thin wall steel-backed bearings lined with copper-lead indium; similar bearings are fitted to the big-end of each connecting rod. The small-end bearings are lead-bronze bushes.

The overhead valve mechanism is operated by a single camshaft through push rods and self-adjusting hydraulic tappets. The solid push rods for the brake pumps are also operated directly by the camshaft.

ENGINE LUBRICATION SYSTEM

The engine oil is circulated by a gear type pump mounted on the front of the crankcase and driven by the crankshaft through skew gears.

Oil is drawn from the sump through a fine mesh gauze strainer and is delivered to the bearings under pressure through a Full Flow filter. Uniform pressure delivery is maintained by means of a relief valve in the oil pump.

The hydraulic tappets are lubricated by oil under high pressure through galleries beneath the tappet block. The push rods are fed with oil direct from the tappets (see Fig. 15) and the rocker arm bearings are lubricated under low pressure through the rocker shafts.

The camshaft runs in a trough of oil.

The cylinder walls and piston gudgeon pins are 'splash' lubricated.

The engine lubrication system is shown diagrammatically in Figure 15.

Filling or topping-up

It is essential that the oil in the engine sump is maintained at the correct level. In order to obtain an accurate indication of the oil level, ensure that the car is standing on level ground. Check the oil level by means of the dipstick, marked 'ENGINE', situated on the left-hand side of the engine (see Fig. 16).

It is recommended that the oil level be checked when the engine is cold. If the engine is warm, sufficient time should be allowed, after stopping the engine, for the oil to drain back to the sump, otherwise a false reading will be obtained.

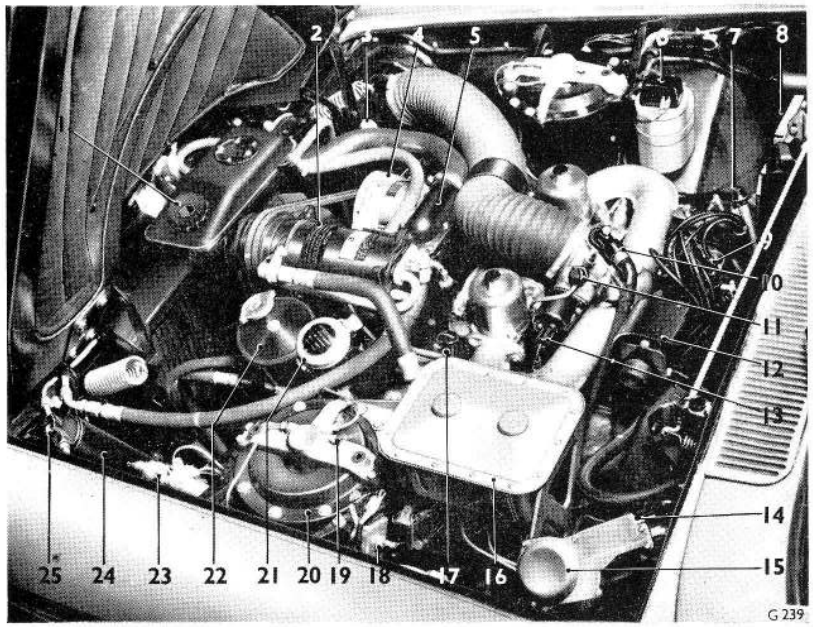


Fig 16 GENERAL VIEW OF THE ENGINE (CARS FITTED WITH A REFRIGERATION SYSTEM)

1 Radiator filler cap
2 Refrigerant pump
3 Air cleaner cover
4 Alternator
5 Thermostat housing
6 Windscreen washer reservoir
7 Gearbox dipstick and filler tube
8 Alternator control and relay box
9 Ignition distributor
10 Engine breather connection
11 Automatic choke solenoid
12 Actuators for upper system flaps
13 Choke thermocoil housing
14 Park position adjusting nut
15 Windscreen wiper motor
16 Hydraulic reservoirs
17 Engine dipstick
18 Actuator for suction throttling valve
19 Bleed screw
20 Levelling ram
21 Engine oil filler cap
22 Steering pump reservoir
23 Roll restrictor valve
24 Drier/receiver unit
25 Sight glass

Filling or topping-up *(continued)*

The oil filler is situated on the front face of 'B' bank cylinder head (see Fig. 16). Open the filler cap and add the fresh oil; after allowing sufficient time for the oil to reach the sump, check that the level is up to the 'Max' mark on the dipstick.

To drain the sump

Drain the sump every 6,000 miles, preferably when the oil is warm after the car has completed a run. If the car is used regularly for town work the sump should be drained and refilled every 3,000 miles.

Place a container in position and remove the drain plug which is situated in the bottom of the sump; remove the plug by means of the adaptor in the tool kit.

Do not attempt to flush the sump with paraffin or petrol.

When refitting the drain plug, ensure that the washer is in position and in good condition.

Oil pressure relief valve

A relief valve unit in the oil pump regulates the oil pressure and maintains it at approximately 40 lb/sq. in.

Oil level indicator

In order to obtain a quick check of the oil level, the fuel gauge on the facia is designed so that when the switch is pressed (see Fig. 4), with the ignition switched on, it will register the approximate quantity of oil in the engine sump. This is intended for use only as a quick check on a journey.

The orange line on the gauge indicates 'Minimum' and if the oil is below this mark, the engine should not be operated. Always use the dipstick to measure the level when actually topping-up with oil.

When carrying out this check, the car should be standing on level ground with the engine switched off.

In addition to checking the oil level, this switch is used also to check that the accumulator warning lamps, coolant level and fuel level warning lamps are satisfactory. These warning lamps will be illuminated when the switch is pressed, unless of course a bulb is faulty.

Oil pressure indicator

An electrically operated oil pressure indicator is fitted on the facia.

Under normal running conditions, the pointer should register within the white band on the instrument scale.

When the engine is idling, a reduced pressure will be indicated.

Oil pressure warning lamp

An amber lamp, mounted in the right-hand side of the switchbox, is illuminated when the ignition is switched on prior to starting the engine; the lamp will be extinguished when the engine is started and the oil pressure increases.

Should the lamp be illuminated under normal running conditions, first check whether the needle on the oil pressure indicator registers within the white band on the instrument scale. If this gauge is reading correctly, the fault will be either in the pressure switch, mounted on the oil filter adaptor, or in the switch wiring; in either case an Officially Appointed Retailer should be consulted. Should the oil pressure indicator register low pressure, stop the engine, then by means of the dipstick, check whether there is sufficient oil in the engine sump. If the level is correct, consult your Officially Appointed Retailer to determine the cause of the low oil pressure.

Oil filter

The Full Flow oil filter element should be renewed every 6,000 miles. Do not attempt to clean it for further service.

Before proceeding to remove the filter bowl, the front of the car should be positioned over a pit; if a pit is not available raise the car on jacks or upon ramps.

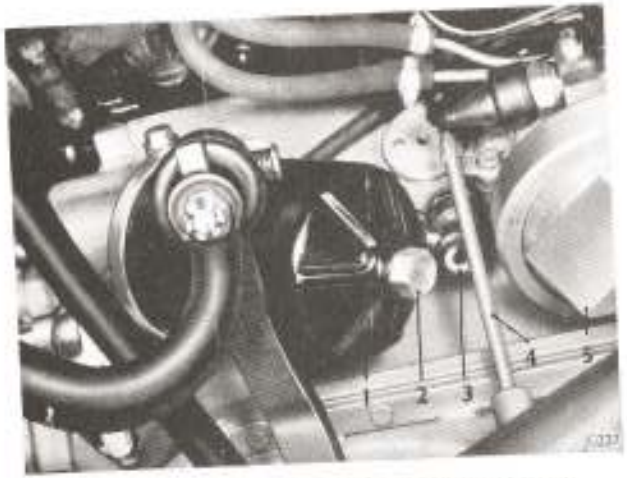


Fig 17 ACCESS TO THE OIL FILTER AND CYLINDER BLOCK DRAIN TAP

1 Oil filter
2 Securing setscrew
3 Cylinder block drain tap
4 Engine dipstick cover
5 Front hydraulic accumulator

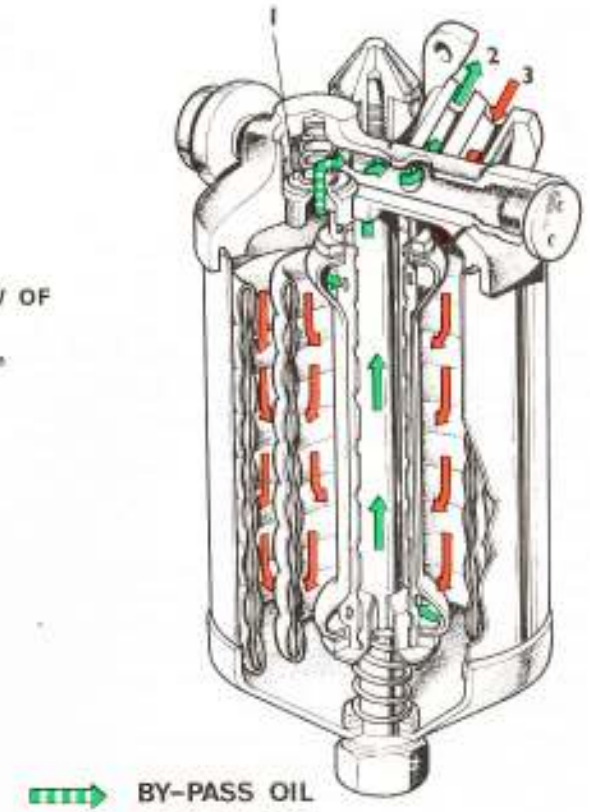


Fig 18 SECTION VIEW OF OIL FILTER

1 Filter by-pass valve
2 To engine
3 From oil pump

Support the filter bowl by hand and unscrew the setscrew at the bottom of the filter.

When removing the bowl it should be kept as upright as possible to avoid spilling the oil. Drain the oil and discard the element. Clean the bowl, ensuring that the rim of the bowl is free from foreign matter.

Fit a new element and a new rubber sealing ring; lightly smear the rubber ring with grease to hold it in position. Fit a new joint washer to the setscrew, half fill the bowl with clean oil and refit the bowl. Check the level of oil in the engine sump and if necessary top-up with an approved oil. Run the engine and inspect the filter joint for signs of oil leaks, then stop the engine and again check the oil level.

Crankcase breather

The engine crankcase is ventilated through a breather tube connected to the carburetter air induction system.

A flame trap, in the form of seven gauze filters, is fitted into the union on the oil filler tube.

Every 24,000 miles, the filter in the flame trap should be removed and cleaned as follows.

Unscrew the setscrew securing the breather pipe union to the oil filler pedestal; disconnect the union from the pedestal (slight resistance may be felt owing to the rubber joint on the union). Remove the union from the pipe.

Wash the filters in clean petrol, then dry them with a high pressure air line.

Before fitting the union to the oil filler pedestal, check the condition of the rubber sealing rings and if necessary renew them.

ENGINE COOLING SYSTEM

Topping-up the radiator

Your engine cooling system is pressurised – **do not remove the radiator filler cap while the engine is running** otherwise, internal pressure may blow out hot coolant. It is advisable to check the level of coolant in the radiator header tank every 3 months and when the engine is cool. If it is necessary to check the level when the engine is hot, muffle the radiator cap with a thick cloth and gradually turn the cap anti-clockwise until the pressure is reduced, then remove the cap.

If the warning lamp marked 'Coolant' is illuminated, the coolant level will be too low. If the level is low, top-up the radiator with the correct anti-freeze mixture. Except in an emergency, water should not be used to top-up the radiator as this will reduce the percentage of anti-freeze.

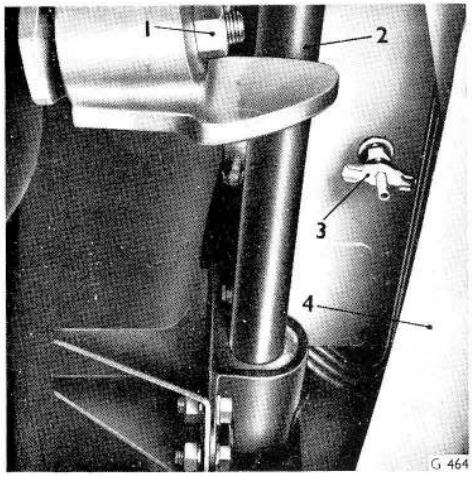


Fig 19
RADIATOR DRAIN TAP

1 Suspension pivot point
2 Anti-roll bar
3 Radiator drain tap
4 Front bumper

In order to check if the warning lamp bulb is operating satisfactorily, press the oil level indicator switch with the ignition switched on; all the lamps in the main warning lamp panel should be illuminated.

Overheating of the engine can be caused by leaves, insects, etc., which may collect on the front of the radiator matrix and impede the flow of air. These restrictions should be blown off with compressed air, or flushed out with water from a pressure hose, from the rear of the radiator.

Draining the system

Annually, the cooling system should be drained and refilled with an approved anti-freeze mixture as described below.

To drain the cooling system, remove the filler cap from the radiator header tank and open the three drain taps positioned one at the bottom of the radiator and one at each side of the crankcase (see Figs. 17 and 19).

Switch on the ignition but do not start the engine; turn fully clockwise either the 'UPPER' or the 'LOWER' switch to assist in draining the heater matrix.

Flushing the system

Every 2 years, the cooling system should be drained and the system 'reverse' flushed. This can be undertaken by an Officially Appointed Retailer or at one of the Service Stations in London or Crewe.

On no account must any strong alkaline compound or detergent be used to clean the cooling system. Several such compounds are available but the use of these must be carefully avoided as they have a detrimental chemical action on aluminium alloys.

Drain the cooling system as previously described.

To flush the radiator, disconnect the top and bottom hoses then connect the upper hose to a waste pipe and apply water under pressure through the lower hose of the radiator. Mains water pressure will remove all loose sediment in about half an hour's flushing.

Before flushing the engine coolant passages, remove the crankcase drain taps and the thermostat. Apply water under pressure to the drain tap apertures and flush through for approximately half an hour or until the water runs clear. Refit the taps and the thermostat.

To flush the heater matrix, detach the matrix hose at the electrically operated water tap and disconnect the return hose to the coolant pump. Attach a waste pipe to the inlet hose of the matrix and apply water under pressure to the coolant pump return hose. Flush the matrix for approximately half an hour.

Examine the coolant hoses; if they show signs of deterioration, fit new hoses. Replenish the system with a fresh anti-freeze mixture (see Page 68). Switch on the ignition but do not start the engine; turn fully clockwise either the 'UPPER' or the 'LOWER' switch to ensure the system is completely filled. Initially mix the quantity of anti-freeze specified for the frost

Flushing the system *(continued)*

protection required with an equal quantity of water. Pour the solution into the radiator header tank slowly to avoid air locks. Finally top-up the radiator header tank with water to reduce the percentage concentration of anti-freeze.

To ensure uniform distribution of the anti-freeze throughout the system, run the engine until normal operating temperature is reached. Stop the engine, check the coolant level and top-up if necessary.

Anti-freeze

The car is delivered with 25 per cent anti-freeze mixture in the cooling system which will give protection against 20°F. or 11.1°C. of frost.

A 25 per cent mixture of an approved anti-freeze should be used all the year round; this not only provides protection against frost during cold weather, but also prevents corrosion of the coolant passages.

In countries where more severe winter conditions are encountered, the percentage of anti-freeze in the mixture should be increased. An approximate indication of the protection against frost, ensured by differing amounts of anti-freeze in the system, is given below:

Anti-freeze (Imp. pints)	8.4	11.2	12.6	14
Anti-freeze (%)	30	40	45	50
Freezing point °C.	−16.1	−25	−30	−36.5
°F.	3	−13	−22	−33.7
Degrees of frost °C.	16.1	25	30	36.5
°F.	29	45	54	65.7

Use only an anti-freeze marketed by a reputable manufacturer and conforming to **British Standard Specification 3150 : 1959;** this specification number will be marked on the container.

Although anti-freeze solutions conforming to British Standard Specification 3151 : 1959 and 3152: 1959 are available, only the solution conforming to British Standard Specification 3150 : 1959 should be used as it contains a corrosion inhibitor specifically designed for use with aluminium engines.

Do not mix different types of anti-freeze at any time.

The cooling system should be drained annually and refilled with an anti-freeze to the above specification; the old coolant should be discarded.

Every 2 years, the system should be drained and reverse flushed as described on Page 67.

Coolant inhibitor

In countries where the ambient temperature is above freezing point at all times, and anti-freeze is not available, a solution of coolant inhibitor and water must be used in the cooling system all the year round to prevent corrosion of the coolant passages.

The approved inhibitor is SQ 36 which can be obtained from your Retailer. 3 fluid oz. of the concentrate should be added to each Imp. gallon of water in the cooling system; the capacity of the cooling system is 3½ Imp. gallons.

After filling the cooling system, start the engine and run it for a few minutes to distribute the solution throughout the system.

Annually, the cooling system should be drained and refilled with a fresh solution of SQ 36 inhibitor and clean water. Every 2 years, the system should be drained and reverse flushed as described on Page 67.

Coolant pump

The coolant pump bearings are self-lubricating and require no attention.

Engine thermostat

The thermostat is fitted in the coolant outlet pipe between the engine and the radiator header tank (see Fig. 16); this prevents circulation of the coolant through the radiator until the engine has warmed and attained normal operating temperature.

The coolant by-passes the radiator when the thermostat valve is closed and thus ensures rapid warming-up of the engine and the car heating system.

BELT ADJUSTMENT

Two matched pairs of belts are driven by the crankshaft pulley. One pair drives the coolant pump fan and the power assisted steering pump. The other pair of belts drive the generator; if a refrigeration compressor is fitted, an alternator replaces the generator and the belts will then drive these auxiliaries.

If a marked difference is observed in the tension of one belt in a pair to that of the other belt, a new matched pair of belts should be fitted.

Generator

The generator pivots upon a bracket on the inlet manifold and two struts which are secured to the coolant pump cover. It is secured in the optimum position by means of a clamping bolt located in the adjusting slot of a swivel arm.

The belts are correctly adjusted when an applied force of 6 lb. at the centre of the belt run, causes each belt to deflect ⅜ in. With experience, it is possible to check the belt tension without a spring balance by deflecting the belts using normal hand pressure. To adjust the tension of the belts, slacken the two setscrews securing the struts on the coolant pump cover, also slacken the mounting nuts on the front and rear of the generator; these nuts are on the right-hand side of the generator (viewed from the front of the engine). Slacken the nut at the front of the generator on the left-hand side mounting lug, then slacken the large distance piece nut between the adjusting link and the generator mounting lug. Move the generator as required, then carefully tighten all the nuts and setscrews, then check the belt tension.

Alternator and refrigeration compressor (if fitted)

On cars fitted with a refrigeration compressor, an alternator is fitted instead of a generator.

The refrigeration compressor is mounted in the position described previously for the generator and the belt tension is also the same; belt adjustment is carried out at the alternator. To adjust the belt tension, slacken the locking nut on the lower front pivot bolt, then slacken the nut on the rear pivot. Slacken the setscrew securing the alternator to the adjusting link and slacken the setscrew securing the adjusting link to the coolant pump housing. Move the alternator as required, then carefully tighten all the nuts and setscrews and finally check the belt tension.

Coolant and steering pump

The steering pump is mounted upon a casting which is pivoted at its apex upon a stud adjacent to the engine oil filler cap. It is secured in the optimum position by means of a nut and washer at its lower edge.

The belts are correctly adjusted when an applied force of 8 lb., at the centre of the run between the coolant pump and power assisted steering pump pulleys, causes each belt to deflect $\frac{3}{8}$ in. (see Fig. 37). With experience, it is possible to check the belt tension without a spring balance by deflecting the belts using normal hand pressure.

IGNITION TIMING

The normal static ignition is 2° before T.D.C. (see Fig. 21). A hand adjustment (the octane selector) is provided on the distributor to adjust the ignition timing (see Fig. 42). If the only fuel available is of an inferior quality, it is necessary to retard the ignition to provide smoother running.

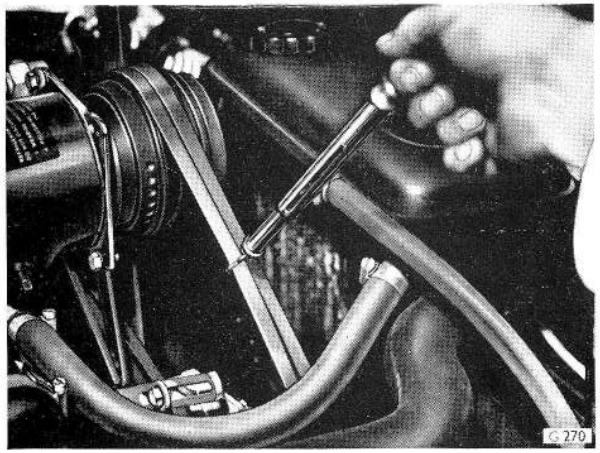


Fig 20 CHECKING TENSION OF ALTERNATOR BELTS

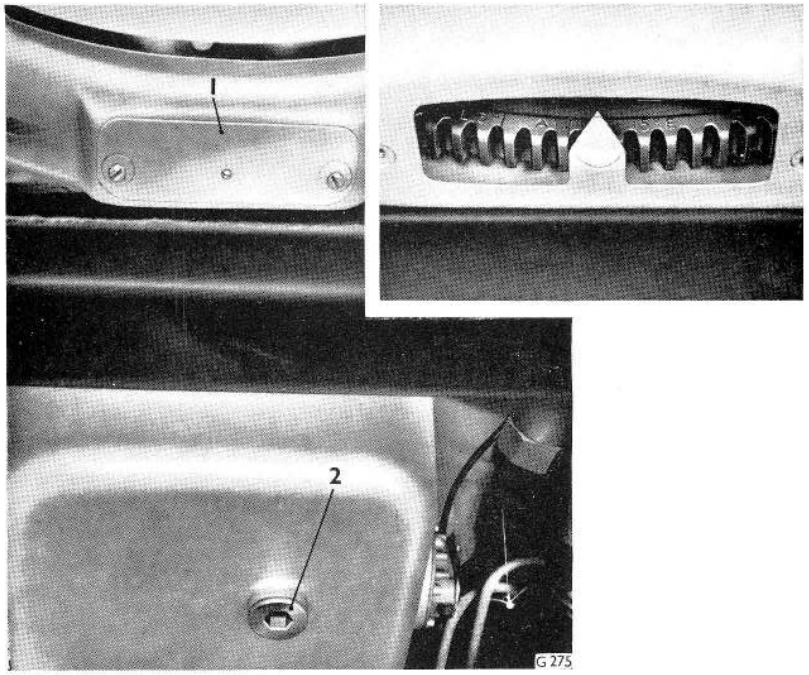


Fig 21 ENGINE SUMP DRAIN PLUG AND FLYWHEEL TIMING MARKS

1 Timing inspection cover 2 Engine sump drain plug

When the car leaves the factory this adjustment is fully advanced for use with the specified fuel (see Page 23).

The stroboscopic ignition timing is 3° before T.D.C. with the engine running at between 475 r.p.m. and 500 r.p.m.

TAPPETS

The valves are operated by hydraulic tappets, therefore, no adjustment is necessary or possible.

The tappets are primed and fed by the high pressure oil system. A light tapping may be audible when first starting the engine and will be evident for a few seconds; this is normal, but the tapping will disappear when the oil has circulated.

The brake pumps are operated by solid tappets which are integral with the solid push rods. Provision is made for adjustment of these tappets, but this should be necessary only after long service.

CHAPTER 5

FUEL SYSTEM AND CARBURETTERS

Fuel tank

A sediment trap is provided in the fuel tank to facilitate the removal of any foreign matter which may have accumulated in the tank.

Every 24,000 miles it is advisable to slacken the drain plug, one or two turns, to drain any accumulation of water or sediment from the tank. Afterwards, ensure that the plug is securely tightened.

If the drain plug is ever removed, it should be cleaned and coated with Marlube Moly 51 lubricant before refitting it.

Rear fuel filter

The rear fuel filter, shown in Figure 22, is mounted on the right-hand side of the car, below the forward edge of the luggage compartment floor. The filter contains a filter element which purifies the fuel passing to the fuel pump. The filter element should not be cleaned but should be renewed every 48,000 miles.

To renew the filter element, remove the two setscrews and washers securing the rear filter mounting bracket to the right-hand luggage compartment floor stiffener (see Fig. 22).

Lower the filter on the flexible petrol pipes until the three screws on the top cover are accessible. Remove the three setscrews and separate the filter bowl from the top cover, taking care not to spill any petrol. After separating, it is advisable to secure the top cover in as high a position as possible to prevent petrol leakage from the petrol tank due to gravity. Note the position of the filter element then, remove and discard the element. Carefully clean all the components in petrol. Fit the new element, then fit the filter bowl to the top cover with the three setscrews; the setscrews should be tightened evenly.

After fitting the rear fuel filter check for fuel leaks at the rear filter.

Fuel pumps

The electric fuel pumps are mounted on the right-hand side of the car as shown in Figure 23. Access to the pumps is from beneath the car. The pumps are of the solenoid operated, diaphragm type which operate only when the ignition is switched on. The fuel pump unit comprises two independent pumps delivering into a common chamber. Two internal filters are provided and no maintenance is required for these filters.

Every 6,000 miles, check the functioning of the fuel pumps. Disconnect in turn the electrical leads and check each pump independently.

Every 24,000 miles, the fuel pumps should be removed from the car and checked for pumping efficiency. If necessary the fuel pumps should be renewed.

CARBURETTERS

Twin S.U. HD.8 carburetters are mounted on an induction manifold which is common to both cylinder banks. Each carburetter supplies four cylinders, two in each bank.

The degree of throttle opening, the speed of the engine and the load against which the engine is operating are all factors which govern the gas pressure in the induction manifold. The difference between atmospheric pressure and the pressure in the manifold, is used automatically in each carburetter to adjust the position of an air valve piston. This piston carries a tapered needle which regulates fuel delivery through the main jet (see Fig. 25). A hydraulic damper plunger, in a hollow stem of the piston guide,

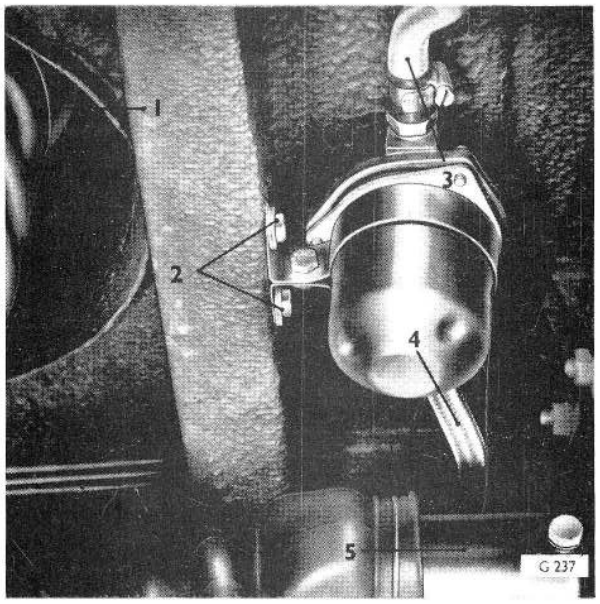


Fig 22 THE REAR FUEL FILTER

1 Right-hand rear spring
2 Filter securing screws
3 Outlet pipe
4 Inlet pipe
5 Right-hand drive-shaft

Carburetters *(continued)*

retards the rising of the air valve piston during acceleration, thus providing an enriched mixture during this period.

Both carburetters utilise air drawn through a common air filter and silencer fitted under the right-hand front wing (see Fig. 26).

Carburetter oil reservoirs

The upper portion of the guide spindle, attached to the air valve piston in each carburetter, is hollow and is filled with the same type and grade of oil as is used in the engine; the oil surrounds a small damper piston containing a sleeve valve (see Fig. 25). The damper piston is mounted on a rod which is integral with the damper filler plug; when the air valve piston rises, under conditions of acceleration, the oil trapped in the lower portion of the damper cylinder forces the sleeve valve closed to provide a cushion of oil which opposes the rising action of the piston. Downward movement of the piston is unrestricted as the sleeve valve opens and permits oil to pass from the space above the damper plunger to the space below.

Every month, the filler plug and damper piston should be removed from the top of each carburetter and the damper reservoir topped-up to a point $\frac{1}{2}$ in. from the top of the tube.

Air valve pistons

Every 6,000 miles, the air valve pistons should be removed and cleaned.

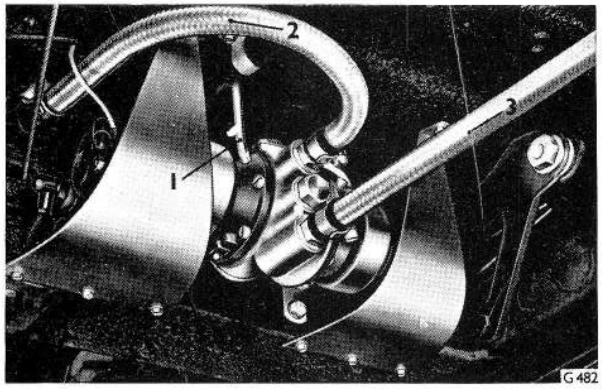


Fig 23 THE FUEL PUMPS

1 Breather pipe
2 Outlet pipe
3 Inlet pipe

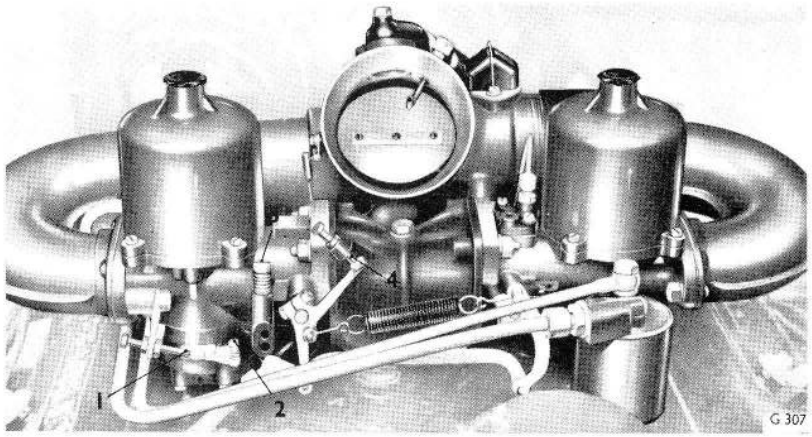


Fig 24 THE CARBURETTERS

1 Full throttle stop screw
2 Jet adjustment screw
3 Volume adjustment screw
4 Slow running throttle stop screw

Carburetter adjustment

There should be no necessity for disturbing the control adjustments set by the manufacturer, other than occasional attention to the slow running controls as described below.

The following instructions apply to cars without a refrigeration system. If the settings require alteration on cars fitted with a refrigeration system it is advisable to consult your Retailer.

The engine slow running speed is set by the throttle stop screw (see Fig. 24). However, the balance of the carburetters has a significant effect upon the slow running speed and must be adjusted by the volume screws shown in Figures 24 and 25. Each volume screw controls the restriction in a passage through which air is allowed to by-pass the carburetter throttle.

The mixture strength for slow running is set by the jet adjusting screw on the side of the main body of each carburetter (see Fig. 24). This screw raises or lowers the jet tube via a lever. The jet tube is attached to a rubberised diaphragm covering the main jet well. Turning the screw clockwise lowers the jet and enriches the mixture; turn the screw anti-clockwise to raise the jet and weaken the mixture.

Adjustment procedure

Each phase of this operation should be completed for both carburetters before the subsequent phase of the adjustment is undertaken.

Run the engine until it reaches normal running temperature, then switch off the ignition.

Screw down the volume screw on each carburetter as far as possible, then unscrew, $1\frac{1}{2}$ turns.

Start the engine and manipulate the jet adjusting screw of each carburetter to obtain smooth running of the engine; adjust the volume screws to obtain the maximum smoothest engine speed without causing the car to 'creep' when in gear. Use the volume screws to 'balance' the carburetters so that the hiss, heard from each carburetter, is of equal intensity.

Do not unscrew the volume screws more than 2 complete turns from the fully closed position, otherwise an annoying whistle from the carburetters

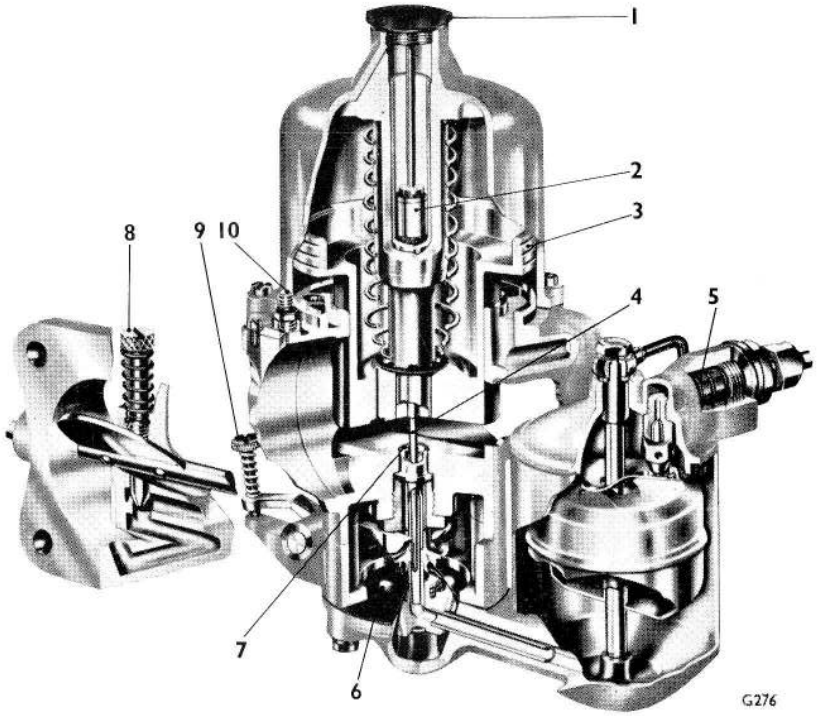


Fig 25 CUT-AWAY VIEW OF ONE CARBURETTER

1 Oil reservoir cap
2 Hydraulic damper piston
3 Air valve piston
4 Needle
5 Filter
6 Diaphragm
7 Jet
8 Volume adjustment screw
9 Jet adjustment screw
10 Vacuum pipe union

may result. If 2 complete turns are insufficient, the slow running speed may be raised further by careful adjustment of the throttle stop screw shown in Figure 24; afterwards, lock the screw by means of the lock-nut. After setting the carburetters, road test the car and if necessary adjust the T.V. controls.

LOCATING A FUEL SUPPLY FAILURE

1. Ensure that there is a supply of fuel in the tank. The green warning lamp on the facia will be illuminated if the fuel reserve falls below three gallons. If the tank is empty, the fuel pumps will 'tick' continuously.
2. Disconnect the outlet pipe from the pumps then switch on the ignition.
   (a) If a steady supply of fuel is emitted, refit the pipe. Check fuel delivery at the carburetter float chambers by slackening both inlet unions. Examine the filters located in the float chamber bodies. Clear the carburetter feed pipe if necessary.
   (b) In cases of little or no fuel delivery from the pumps, check and if necessary, renew the rear fuel filter element. Ensure that the pipe from the tank to the rear filter is not obstructed. If the pumps fail to operate with the inlet pipe disconnected, check the electrical supply to the pumps by connecting a 12 volt bulb between the supply lead and a good earth contact. If the pump fails to operate, remove the unit and return it to a Retailer for renewal.

AIR FILTER AND SILENCER

The air filter and silencer are mounted beneath the right-hand front wing of the car (see Fig. 26) and can be reached by raising the bonnet.

Removing the filter elements from the air silencer

To remove the filter elements, unscrew the knurled nut on the side of the unit (see Fig. 26) then remove the cover together with the outlet hose.

Remove the hexagonal nut from the centre stud, then dismantle the air filter in the following manner.

On cars fitted with paper elements, withdraw the outer locating plate, sealing ring, element, sealing ring, two locating plates, sealing ring and finally the second element (see Fig. 26). Note that the cone end of each locating plate fits into the element bore.

On cars fitted with wire mesh elements, the dismantling procedure is similar to that previously described, except that four sealing rings are not fitted.

All cars destined for the following countries are fitted with paper air filter elements.

Africa (including Algeria, Egypt, Kenya, South Africa, Morocco, Sudan, Tunis, Madeira, Tangiers, Nigeria, etc.) also Asia (including India, Turkey, Iran, Iraq, Syria, Lebanon, Israel, Jordan, Hong Kong, etc.) also Australia, New Zealand, Spain, Portugal, Greece, Yugoslavia, Gibraltar, South America, Jamaica, Bahamas and Mexico.

Air filter and silencer *(continued)*

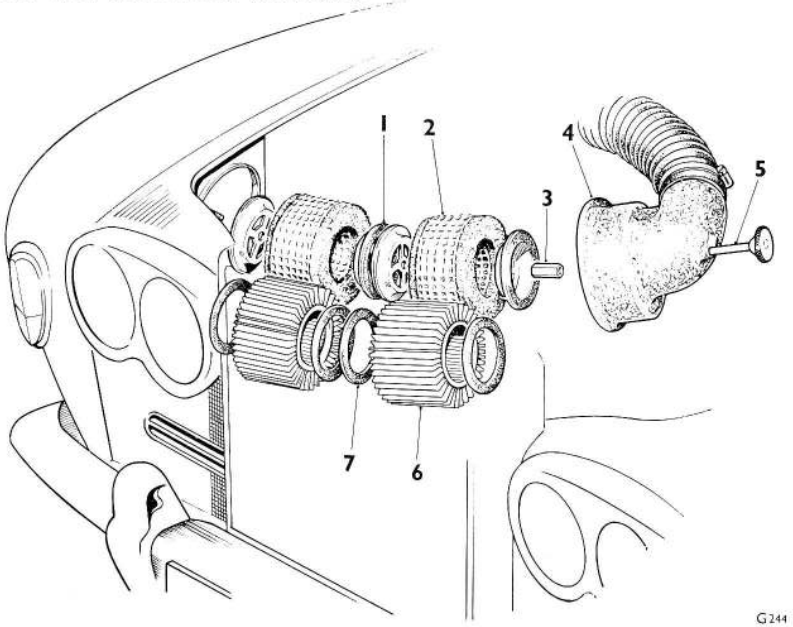


Fig 26 EXPLODED VIEW OF AIR FILTER

1 Locating plate (four required for paper or wire elements)
2 Wire element
3 Securing nut
4 Cover
5 Securing bolt
6 Paper element
7 Sealing washer (four required for paper elements only)

The elements of this filter should be renewed every 12,000 miles. Should the elements require cleaning before this time, cleaning can be effected by applying a high pressure air line to the inside of each element. On no account must oil or petrol be allowed to come into contact with the elements.

All cars destined for countries other than those overleaf are fitted with oil wetted wire mesh air filter elements.

Every 6,000 miles the filter elements should be removed and washed thoroughly in petrol.

After washing, all surplus petrol should be removed by blowing through the elements from the inside with a high pressure air line.

The filter elements should then be completely immersed in engine oil and allowed to soak for a period of approximately five minutes then afterwards allowed to drain for a period of two hours.

Fit the elements to the silencer ensuring that the locating plates are correctly positioned (see Fig. 26).

TRANSMISSION

THE GEARBOX

The automatic gearbox combines epicyclic gear trains with a fluid coupling and provides automatic control of gear changes. The epicyclic gear trains provide four forward ratios and a reverse.

It is essential for efficient operation of the gearbox that only an approved transmission fluid be used and that the fluid level in the gearbox is regularly inspected and maintained.

In an emergency, if none of the approved fluids are available (see Page 58) top-up with S.A.E. 10 engine oil rather than drive with insufficient oil, but ensure that the gearbox is drained and refilled with the correct fluid at the earliest opportunity.

To ensure that the car is not made immobile through unlikely failure of the electrically operated gearchange selector mechanism, provision has been made to operate the gearbox selector mechanism manually (see Chapter 2).

Checking the fluid level

The fluid level in the gearbox can be checked accurately only when the car is on a level surface, the engine is running and the fluid is at the normal operating temperature, approximately 176°F. (80°C.). With the gearbox fluid at the normal operating temperature, the recommended procedure is as follows.

Ensure that the selector lever is in the neutral position 'N' and that the hand brake is applied. At this point it is advisable to remove the gearbox actuator thermo cut-out from the main fuse box to ensure against accidental selection of a gear; this cut-out has a red button on top for manual resetting. Start the engine and run it at idling speed for approximately three minutes.

Release the bonnet lock and raise the bonnet; the combined dipstick and filler for the gearbox is situated close to the bulkhead (see Fig. 16) and has the word 'gearbox' stamped on the cover of the dipstick tube. Thoroughly clean the area around the dipstick then, with the engine still running, remove the dipstick and check the fluid level.

If topping-up is necessary, add the approved fluid in small quantities, checking frequently to make sure that the level does not exceed the 'max' mark. When filling, ensure that the fluid and containers are absolutely clean. After topping-up the gearbox, fit the thermo cut-out for the gearbox actuator.

If a fluid leak is detected, report the matter to a Retailer.

Draining and refilling the gearbox

The gearbox should be drained completely then filled with fresh Automatic Transmission Fluid every 12,000 miles as follows.

Clean the area around the drain plug in the gearbox sump (see Fig. 27). Place a container in position then remove the plug together with its aluminium washer.

Remove the lower cover from the bell housing and turn the engine so that the fluid coupling drain plug is at its lowest point; place a container in position then remove the plug and drain the fluid from the coupling.

After draining, fit both plugs together with new sealing washers and tighten them securely. It is important not to overstress the plug in the fluid coupling when tightening; the torque loading for this plug is 5 lb.ft. to 7 lb.ft.

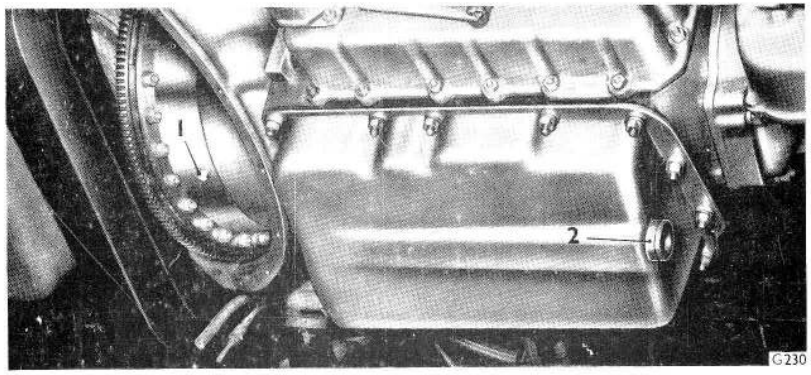


Fig 27 GEARBOX AND FLUID COUPLING DRAIN PLUGS

1 Fluid coupling drain plug 2 Gearbox drain plug

Remove the dipstick and pour in 12 Imperial pints of the approved fluid; the fluid coupling and the gearbox sump are filled through the same orifice.

With the selector lever in the neutral position and the hand brake applied, start the engine and run it at fast idle speed for approximately five minutes. To prevent accidental selection of a gear, it is advisable to remove the gearbox actuator thermo cut-out from the main fuse box.

Stop the engine and add a further 10 Imperial pints of fluid to the gearbox.

Start the engine and whilst running it at slow idle, check the fluid level with the dipstick and if necessary add sufficient fluid to bring the level to the 'max' mark. Take care not to overfill.

Check for leaks, then fit the bell housing lower cover and the thermo cut-out for the gearbox actuator.

Run the car until the gearbox reaches normal operating temperature of 80°C. then finally check the fluid level with the dipstick and if necessary top-up.

PROPELLER SHAFT

A single piece propeller shaft, incorporating resonance dampers, is used to transmit engine torque to the final drive unit.

The front end of the shaft is coupled to the gearbox output flange by a ball and trunnion universal joint and the rear end is connected to the final drive pinion flange by a universal joint.

After universal couplings have been fitted to the propeller shaft, the whole assembly is dynamically balanced to prevent torsional vibrations.

Lubrication and maintenance

Every 6,000 miles examine for serviceability the neoprene seal of the ball and trunnion joint. On initial assembly the front joint is packed with 1½ oz. of Retinax 'A' grease and will require no additional lubrication.

Every 24,000 miles, examine the rear joint for leakage; if the joint is dry, no further maintenance is required except to check the torque tightness of the securing bolts. The bolts should be torque tightened to between 42 lb.ft. and 45 lb.ft. At the same time check the torque tightness of the bolts securing the joint to the gearbox flange and if necessary tighten them. The bolts should be torque tightened to between 70 lb.ft. and 75 lb.ft.

THE FINAL DRIVE UNIT

The final drive unit is mounted on a fabricated cross-member which is insulated from the body by two resilient metal mounts. The unit comprises a centre differential gearbox which contains the hypoid crown wheel, pinion gears, the differential housing and two short drive-shafts which transmit the drive to the rear wheels. The inner end of the drive-shaft for each wheel is connected by a ball and trunnion joint to a final drive output shaft; the outer end of each drive-shaft is connected by a universal coupling to a stub axle. The ball and trunnion joint on each side of the final drive unit, is enclosed by a convoluted neoprene seal to prevent dirt and water entering the joint and to prevent oil leakage.

Lubrication and maintenance

The final drive unit should be drained when the oil is warm as follows.

Clean the area around the drain plug and the oil level plug.

Place a container in position beneath the drain plug then remove both the drain and level plugs using the adaptor provided in the tool kit.

After draining, fit the drain plug complete with a new joint washer then, using a syringe, fill the casing up to the level plug orifice with an approved oil (see Page 58); approximately 4½ Imp. pints of oil will be required.

Fit the level plug, using a new joint washer, then check for leaks.

On initial assembly each drive-shaft ball and trunnion joint adjacent to the final drive unit is filled with 150 c.c. of oil and requires no attention, unless a neoprene seal is damaged.

Lubrication and maintenance *(continued)*

Every 6,000 miles, examine the condition of the neoprene seal covering each ball and trunnion joint. If any sign of leakage is apparent, an Officially Appointed Retailer should be consulted.

Every 12,000 miles, check the level of oil in the final drive unit by removing the level plug in the rear of the casing (see Fig. 28). If necessary, top-up to the level plug orifice, then fit the level plug using a new joint washer.

Every 24,000 miles, the final drive unit should be drained and refilled as previously described. Also at this mileage, the grease nipple on each driveshaft outer universal joint should be lubricated.

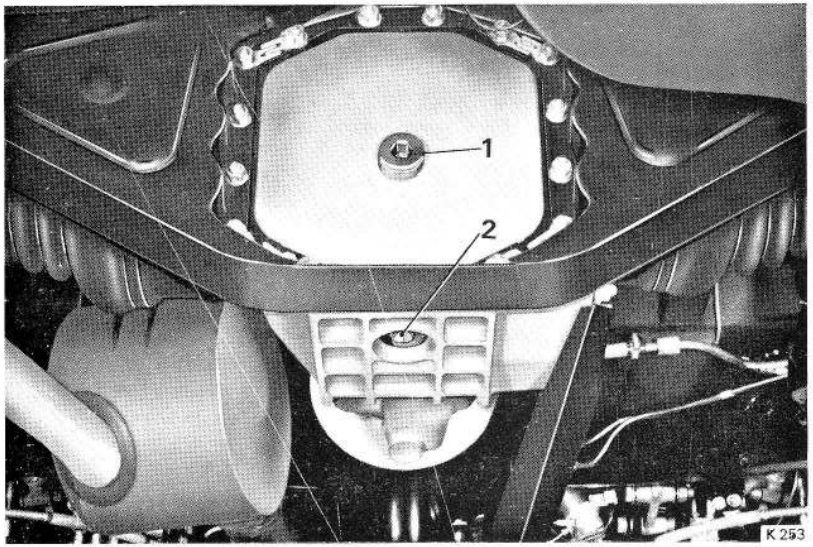


Fig 28 FINAL DRIVE UNIT

1 Oil level/filler plug 2 Drain plug

BRAKING SYSTEM

Disc brakes are fitted to all wheels, two twin cylinder calipers are fitted to each front wheel and one four cylinder caliper to each rear wheel.

The braking system comprises three separate and independent hydraulic circuits. Two are power brake circuits and the third a master cylinder brake circuit. Normally all the hydraulic circuits are in operation when the brake pedal is applied and the engine is running.

The master cylinder brake circuit comprises a master cylinder mounted at the rear of the foot brake pedal linkage; the master cylinder is primed with hydraulic fluid from the reservoirs, mounted on the left-hand side of the engine compartment. When the brake pedal is applied, the master cylinder applies hydraulic pressure and operates the lower pair of cylinders on each rear wheel caliper, thus forcing the brake pads onto the discs.

The master cylinder circuit is fully operative irrespective of whether the engine is running or not.

The power brake circuit comprises two hydraulic pumps mounted one at the front and one at the rear of the engine. The pumps are operated by the engine camshaft and are primed with hydraulic fluid from the reservoirs mounted on the left-hand side of the engine compartment. When the engine is running, the brake pumps supply hydraulic fluid, under pressure, to the two accumulators mounted on the left-hand side of the engine.

From the accumulators, the hydraulic fluid under pressure is passed to the two distribution valves mounted in front of the master cylinder. When the brake pedal is applied, the distribution valves allow pressurised fluid to be supplied to the front and rear wheel calipers, the pressure being proportioned to the load applied to the brake pedal.

The upper distribution valve controls the supply of pressurised fluid to the cylinders in the rear calipers of the front wheels.

The lower distribution valve controls the supply of pressurised fluid to the cylinders in the front calipers of the front wheels and the upper cylinders in the rear wheel calipers. A pressure limiting valve is mounted at the brake pedal linkage and prevents premature locking of the rear wheels.

In the unlikely event of failure of either the master cylinder brake circuit or one of the power brake circuits, braking will still be available at all four wheels, although of course, the efficiency will not be as high as if all the hydraulic circuits are functioning correctly.

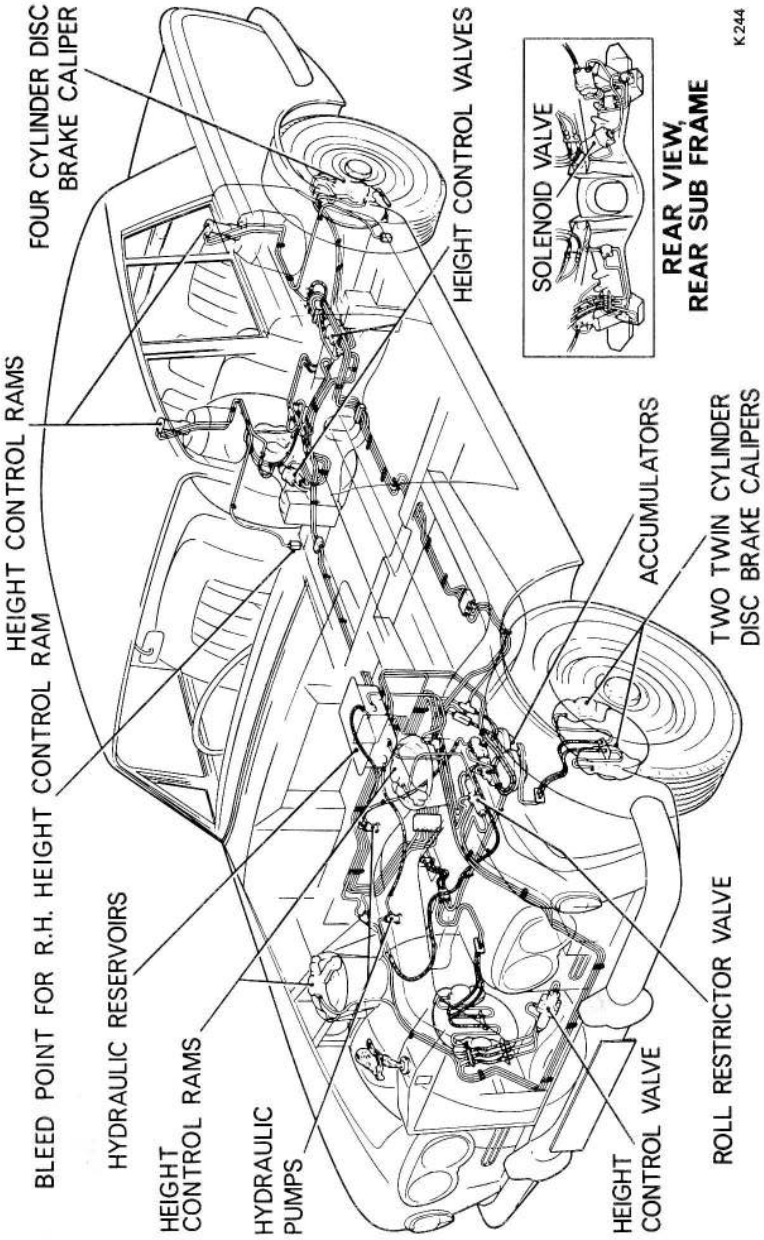


Fig 29 POSITION OF HYDRAULIC COMPONENTS

Braking system *(continued)*

In addition to these hydraulic circuits, a mechanical hand brake system is fitted also; the hand brake operates two small brake pads fitted to each rear wheel.

WARNING LAMPS

Accumulator warning lamps

A red warning lamp for each of the power brake circuits is fitted to the main warning lamp panel on the facia and will be illuminated when the pressure in the respective accumulator falls below the required pressure. The right-hand warning lamp is for the rear accumulator and the left-hand warning lamp is for the front accumulator. These lamps may be illuminated when switching on the ignition, especially after the car has been standing for a long period, but will be extinguished immediately the engine starts. Should one of these warning lamps be illuminated during a journey, this may be due to a failure in one of the high pressure hydraulic circuits. In this case, braking is still available at all four wheels, although of course, the efficiency will not be as high as if all the circuits are functioning correctly. If a warning lamp should be illuminated, an investigation should be made as soon as possible to determine the cause of failure and if necessary, a Retailer should be consulted.

In order to check if the warning lamp bulbs are operating satisfactorily, press the oil level indicator switch with the ignition switched on; all the bulbs in the main warning lamp panel will be illuminated, unless of course, a bulb is faulty.

Warning lamp – hand brake/stop lamp bulb failure

The warning lamp is fitted on the facia, adjacent to the speedometer. The warning lamp serves a dual purpose. Firstly, the lamp is illuminated whenever the ignition circuit is switched on and the hand brake is applied. Secondly, if a stop lamp bulb has failed, the lamp will be illuminated each time the foot brake is applied. In the latter case, it will be necessary to renew the faulty stop lamp bulb at the first opportunity (see Chapter 9). If, after renewing a stop lamp bulb, the warning lamp is still illuminated each time the foot brake pedal is applied, it may be due to a faulty relay; a relay is fitted in each rear wing. In this case, consult a Retailer who will have the relay tested by a skilled electrician.

BRAKE ADJUSTMENT

Front and rear disc brakes

The front and the rear brakes are self-adjusting and wear is taken up automatically. Slight rubbing between the brake pads and the brake discs is normal when the brakes are in the released position.

Hand brake

Adjustment of the hand brake mechanism is achieved automatically by occasionally applying the hand brake, using more force than that normally required.

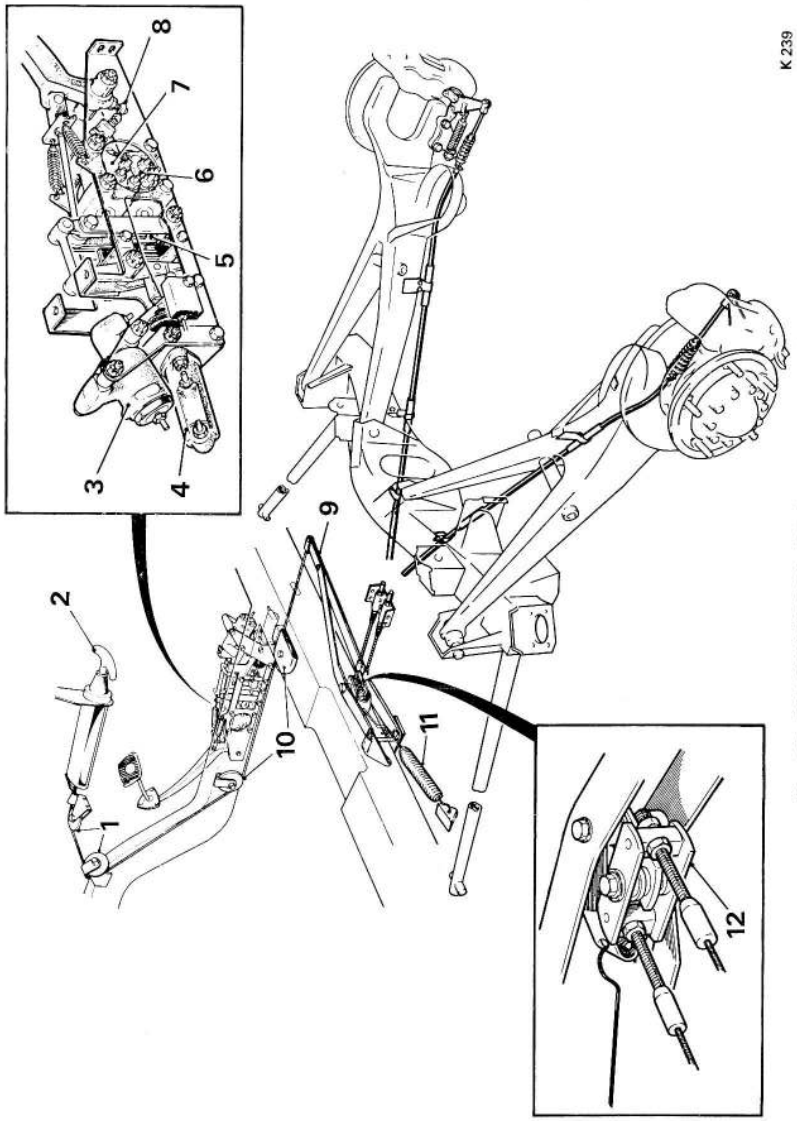


Fig 30 MECHANICAL BRAKE LINKAGES

1 Upper hand brake pulleys
2 Hand brake
3 Pressure limiting valve
4 Master cylinder
5 Distribution valve balance lever
6 Lower distribution valve
7 Upper distribution valve
8 Eccentric adjuster
9 Operating lever
10 Lower hand brake pulleys
11 Return spring
12 Balance lever and cable adjusters

Inspection

Every 6,000 miles inspection of the brake pad linings including the hand brake pads should be made. Should it be necessary to remove the wheels before the end of this period, it is recommended that an inspection of the brake pads be carried out at the same time. Unless the pads are worn to within $\frac{1}{16}$ in. of the steel backing plates, they should be suitable for further service.

Renewing the brake pads

When renewing brake pads, it is necessary to jack up and remove the wheels as described in 'The jacking system'. Ensure that the trailing arms are never supported only by the rebound straps.

It should be noted that when changing brake pads, the linings on the new pads should be of the same material and grade as used on **all the other brakes.** If not, it will be necessary to renew all the brake pads. This is due to the fact that linings produced by different manufacturers vary in their wear and operating characteristics.

To remove one pair of brake pads, first remove the spring clip from each of the two locating pins; the clips are positioned behind the inner brake pads, one at each end of the pads as shown in Figure 32.

Withdraw each locating pin from the rear of the caliper, then remove the two pads from the recesses; if the locating pins are tight, it may be necessary to use a pair of pliers to free them. The front wheel brake calipers have a damping shim fitted between each cylinder face and the steel backing plate of the disc brake pad and it will be necessary to remove these when renewing the disc brake pads. When removing a rear wheel brake caliper, note the position of the anti-rattle spring fitted to each pad.

While the pads are removed, inspect the dust excluders on the calipers and renew them if necessary.

If the new brake pads are lined with an approved lining which differs from the lining previously used, the disc faces should be cleaned prior to fitting the new pads as follows.

All traces of the old pad lining should be removed by rotating the disc by hand whilst applying fine emery paper to the faces. Do not emery the faces radially.

To fit new brake pads, place a pad in the recess on each side of the disc, ensuring that the fibre face of the pad is toward the disc. When fitting rear wheel brake pads, ensure that an anti-rattle spring is fitted to each pad. When fitting the front wheel brake pads, a damping shim should be placed between the cylinder face and the steel backing face of the disc brake pad. Each shim should be fitted so that the arrow pierced in the shim is toward the outer rim of the disc and is pointing in the direction of rotation. The shims are held in position by the locating pins. Lightly grease the locating pins, line up the holes in the pads with the location holes in the calipers and anti-rattle springs, then fit the locating pins from the back of the calipers. Fit the spring

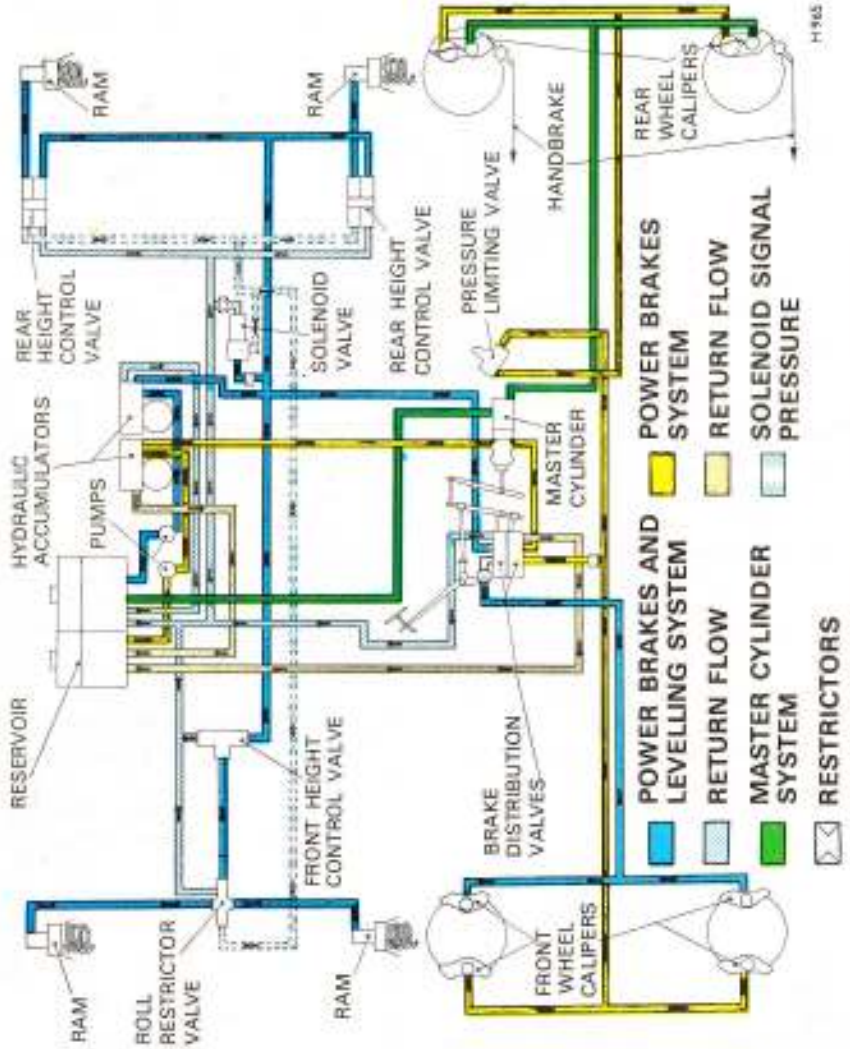


Fig 31 DIAGRAM OF HYDRAULIC SYSTEMS

clips, pushing the straight part of the clip into the hole in the locating pin until it is fastened securely. If in any doubt about the serviceability of the spring clips, they should be renewed.

Renewing the hand brake pads

When renewing the hand brake pads, securely chock the front wheels, release the hand brake, jack up the car and remove the rear wheels.

Place stands under the rear trailing arms or alternatively place stands and wooden protecting blocks under the rear end of the body sills.

Work should be completed on one side of the car before starting on the other side.

Lever the spring steel prong away from the rubber seal which covers the ratchet adjusting nut then remove the rubber seal. Hold the prong clear of the ratchet adjusting nut, then remove the nut by unscrewing it anti-clockwise. The hand brake operating levers can then be pulled apart to give access to the hand brake pads.

The hand brake pads are retained against the operating levers by coil springs, one of which is thicker than the other. Unhook the coil springs from the operating levers then remove the pads and springs.

Fit the springs to the new pads then fit the pads in position and hook the spring ends over the operating levers.

Push both operating levers in toward the disc, hold the adjustment prong clear, then screw the ratchet wheel onto the reaction rod.

The ratchet adjusting nut should be screwed up until a 0.002 in. (0.05 mm.) feeler gauge placed between the inner brake pad and the disc is just gripped. After setting, rotate the discs to ensure no binding takes place.

When this setting has been obtained, fit the rubber seal over the ratchet wheel and release the adjusting prong, ensuring that the end of the prong locates securely in the slot in the rubber seal.

After this initial setting has been carried out, the ratchet assembly will adjust the hand brake automatically; this is effected by occasionally pulling the hand brake on hard.

BLEEDING THE HYDRAULIC CIRCUITS

Bleeding for the purpose of expelling all air from the system should only be necessary when completely recharging the system with fluid, following the removal of a component or the disconnection of a brake hose.

Before removing a component in a power brake circuit, the systems should be depressurised by pumping the foot brake pedal fifty or sixty times; to confirm that the systems are depressurised, switch on the ignition and check that both the red accumulator warning lamps are illuminated. Afterwards, switch off the ignition.

It should be noted that, when renewing any component in the braking system, exceptional cleanliness is required.

It is recommended that bleeding the braking circuits be carried out by a Retailer; should this not be possible, the correct procedure is as follows, noting that only Castrol-Girling Amber Brake Fluid 1738 should be used.

Bleeding the hydraulic circuits *(continued)*

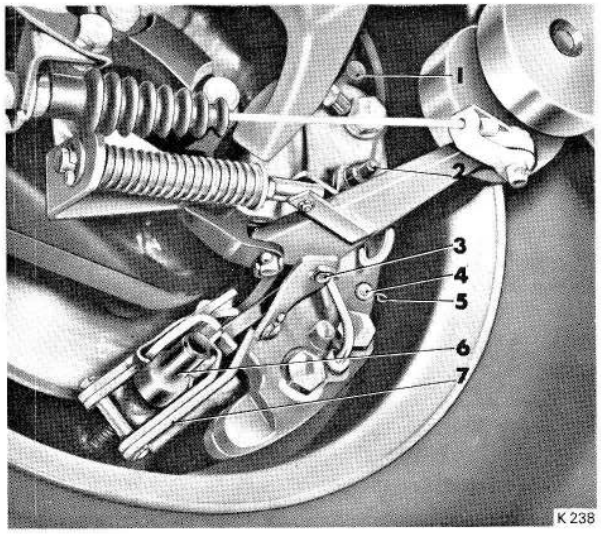


Fig 32 REAR DISC BRAKE

1 Power brake circuit bleed screw
2 Master cylinder circuit bleed screw
3 Disconnecting point
4 Locating pin
5 Securing clip
6 Adjusting ratchet seal
7 Hand brake pads

To bleed the system two operators are required. It is important that the following method of bleeding the hydraulic system is always employed.

Bleeding the master cylinder brake circuit

Ensure that the reservoirs on the left-hand side of the engine are topped-up to the level mark; the reservoir for the master cylinder brake circuit is the rear of the two. It is recommended that the power brake circuits are not depressurised when bleeding the master cylinder brake circuit.

Fit a rubber bleed tube to one of the bleed screws of the rear brake master cylinder circuit and immerse the free end in about one inch of fluid in a clean bottle; this bleed screw is the lower of the two.

Slacken the bleed screw approximately two full turns and pump the foot brake pedal as rapidly as possible until approximately ½ a pint of fluid is bled through then close the bleed screw with the pedal depressed.

The operation should be repeated on the other rear brake ensuring that there is sufficient fluid in the reservoirs; it is not necessary to bleed the front brakes, because the master cylinder brake circuit applies to the rear brakes only.

After bleeding the master cylinder brake circuit, start the engine and run it for approximately four minutes, then top-up the reservoir to the level mark.

Bleeding the power brake circuits

To bleed either of the power brake circuits, start the engine and run it for approximately four minutes to charge the systems. Ensure that the level of fluid in the reservoir of the system concerned is up to the level mark.

The front compartment of the reservoir supplies fluid for the front brake pump which in turn supplies hydraulic fluid under pressure to the front accumulator, the lower distribution valve, the front calipers of the front brakes and the upper cylinders of the rear brakes.

The rear compartment of the reservoir supplies fluid for the rear brake pump which in turn supplies hydraulic fluid under pressure to the rear accumulator, the upper distribution valve, the rear calipers of the front brakes and the height control rams.

Should a fault occur between the brake pumps and the distribution valves, it will be necessary to bleed at all the bleed points in that particular circuit.

If a fault occurs between the distribution valves and the brake calipers, it should be necessary only to bleed at the bleed points between the distribution valve and the brake calipers in the faulty circuit. If in any doubt it is advisable to bleed the complete circuit concerned.

Bleed screws are provided on the side of the accumulators, on each pair of brake calipers and on each height control ram; the bleed screws for the front rams are positioned on top of each ram and the bleed screws for the rear rams are remote from the rams and are positioned on the inner side of each body sill just in front of the rear wheel arch.

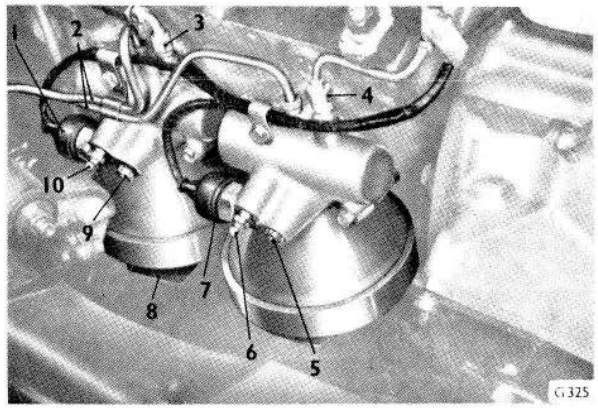


Fig 33 HYDRAULIC ACCUMULATORS

1 Warning lamp switch
2 Return pipes to hydraulic reservoirs
3 Inlet from front brake pump
4 Inlet from rear brake pump
5 Outlet to the distribution valve
6 Bleed screw
7 Warning lamp switch
8 Warning plate
9 Outlet to the distribution valve and automatic height control system
10 Bleed screw

Bleeding the power brake circuits *(continued)*

A power brake circuit should be bled as follows, ensuring that the engine is running and the fluid levels in the reservoirs are kept above the minimum marks at all stages of the bleeding operation; if necessary, the maximum mark may be exceeded. Reference should be made to Figure 29 to identify the components in each circuit.

Allow approximately four minutes to completely charge the systems.

Attach a length of rubber tube to the bleed screw on the side of the accumulator valve concerned, then immerse the free end in about one inch of fluid in a clean bottle. Carefully slacken the bleed screw just sufficiently for the fluid to pass through the tube into the bottle. Bleed until the fluid emerging is free of air bubbles then allow fifteen seconds to elapse before tightening the bleed screw; **it should be noted that the fluid is at high pressure, therefore the bleed screw should only be opened fractionally.**

With the foot brake pedal applied, the remaining components in the circuit concerned should be bled in the following order, the rear calipers, then the front calipers, noting that on the rear calipers the upper bleed screw is for the power brake circuit. If the automatic height control system is part of the circuit being bled, each height control ram should be bled noting that it is unnecessary for the foot brake pedal to be applied. When bleeding the height control rams, the interior of the car should be weighted to compress the suspension sufficiently for the height control valves to actuate and allow pressurised fluid through to the rams and bleed screws. The engine should be running and the automatic height control system should be on fast levelling for this operation. Prior to bleeding the rams, allow 2 minutes to elapse to ensure that the system is fully charged. Bleed each of these components until all the air bubbles cease then allow fifteen seconds to elapse before fully tightening each bleed screw.

After bleeding the power brake circuit concerned, ensure that the fluid in the reservoirs is up to the maximum level mark.

Hydraulic reservoirs

The reservoir for the hydraulic circuits is situated on the left-hand side of the engine as shown in Figure 34.

Every month, check the level of fluid in the reservoirs after first running the engine for four minutes to charge the systems; level marks are provided on the side of the reservoirs. If frequent topping-up is necessary, examine the systems for leaks and consult a Retailer.

It is important that only Castrol-Girling Amber Brake Fluid 1738 be used. Under no circumstances should a mineral oil be substituted for the genuine fluid.

Brake fluid absorbs water from the atmosphere, therefore, in order to minimise contamination, it is important that the fluid should be stored in small sealed containers and that the covers of both the containers and the reservoirs are fitted immediately after replenishing the system.

Lubrication

The hand brake linkage, clevis pins and fulcrum pins should be lightly smeared with Rocol MT265 grease every 6,000 miles. Also, smear the inner hand brake cable where it passes over the hand brake pulleys with this grease.

Every 24,000 miles or 2 years, remove the plastic plugs fitted to the lower two hand brake pulleys, pack the internal cavities of the pulleys with the approved grease, fit new plugs and remove the heads. If plastic plugs are not fitted, it will be necessary to dismantle the pulleys to pack with grease.

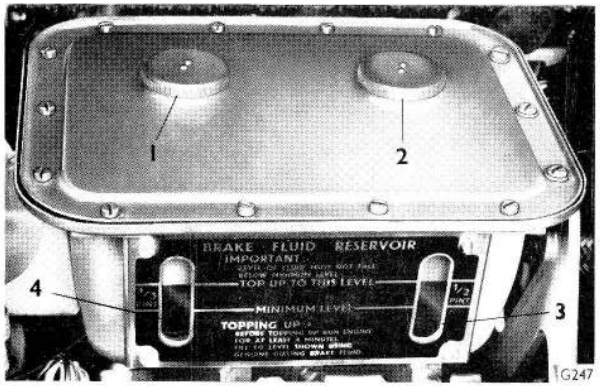


Fig 34 HYDRAULIC RESERVOIRS

1 Front reservoir filler cap
2 Rear reservoir filler cap
3 Rear reservoir sight glass
4 Front reservoir sight glass

SERVICE RECOMMENDATIONS

The following operations may be carried out at the brake pad renewal nearest to the mileage specified.

Under normal motoring conditions it is recommended that the following servicing is carried out at 60,000 miles.

Renew the flexible hoses to the braking systems and automatic levelling system with the exception of the hoses connecting the brake pumps to the accumulators, the hoses connecting the accumulators to the frame connector block and the low pressure return hoses from the automatic levelling system; each of the low pressure return hoses is marked with a white identification sleeve. At this mileage also, renew the disc brake caliper seals and the deceleration conscious pressure limiting valve seals; completely drain the fluid from the hydraulic circuits and then fill with new fluid and bleed the circuits. Renew the master cylinder seals and bleed the circuit.

It is emphasised that the service recommendations are not normal servicing arrangements and will be carried out only at the Owner's request.

CHAPTER 8

STEERING, SUSPENSION, WHEELS AND TYRES

STEERING

The steering mechanism is of the recirculatory ball type, power assisted by hydraulic pressure.

The steering box output shaft is splined into a steering lever which is connected by means of a ball joint to one end of a cross-beam. The other end of the cross-beam is connected by a ball joint to an idler lever which pivots in a housing secured to the front sub-frame. This steering idler box housing incorporates a hydraulic damper which protects the driver against any violent reactions at the road wheels.

Track rods, fitted with ball joints, connect the cross-beam to the stub axle yokes.

Power assistance

The steering power assistance system provides a variable degree of assistance, depending on the effort required to move the road wheels. Maximum assistance is provided when the driver is manoeuvring slowly or parking the car. While maximum assistance is available under these conditions, power assistance is reduced to a minimum under normal straight ahead driving.

The system provides for a degree of 'feel' to be maintained at the steering wheel, therefore, the driver is not isolated from contact with the road wheels, although, he is protected from any violent reaction or 'joggle' on bad roads.

Power assistance is applied hydraulically via an oil pump, driven by the engine (see Fig. 36).

A hydraulic rotary valve, concentric with the input shaft, is located in the rear section of the steering box. When the steering wheel is in the straight ahead position a spool, inside the rotary valve, is held in the neutral position by means of a torsion bar. The spool is attached to one end of the torsion bar and the valve body to the other end. As the steering wheel is turned the torsion bar is twisted; this allows the spool to rotate in relation to the valve body, to operate the rotary valve. The valve then supplies hydraulic fluid, under pressure, to the appropriate side of the piston rack via internal passages and thus assists the driver's effort at the steering wheel.

LUBRICATION

Steering box

The steering box is lubricated under reduced pressure from the hydraulic pump, therefore, no filler plug is provided.

Steering pump

The steering pump is driven by the crankshaft via twin matched belts and operates whenever the engine is running.

Should the car be parked in a position which causes extreme resistance at the road wheels, for example when the front wheels are on full lock against their stops, or when they are hard against the kerb, the pump will build up hydraulic pressure. Excess pressure which is released through the internal relief valve, produces a slight squeal which may be heard within the saloon.

Topping-up the system

Every 6,000 miles, the level of oil in the steering pump reservoir should be checked. If necessary, top-up with one of the approved fluids to a level just above the top of the filter. If an appreciable amount of fluid is necessary to top-up, a leak should be suspected and a Retailer consulted.

It is essential that the oil and the container used for topping-up are absolutely clean.

Every 24,000 miles, the reservoir filter should be renewed.

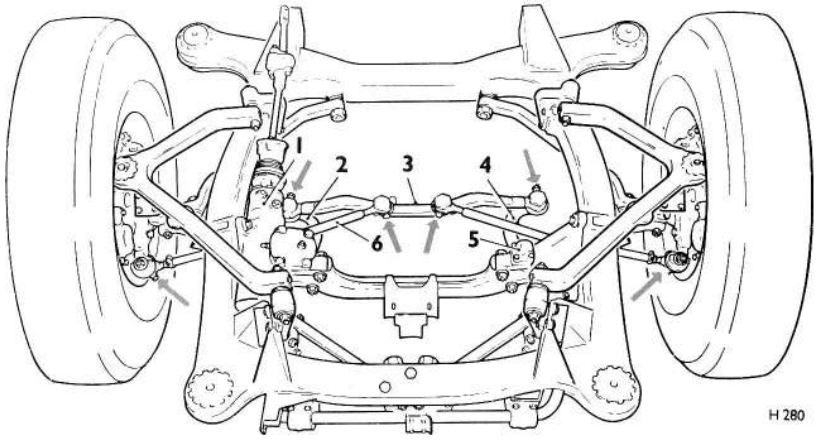


Fig 35 STEERING JOINT LUBRICATION

1 Steering box
2 Steering lever
3 Cross-beam
4 Idler lever
5 Steering idler box damper
6 Track rod

Topping-up the system *(continued)*

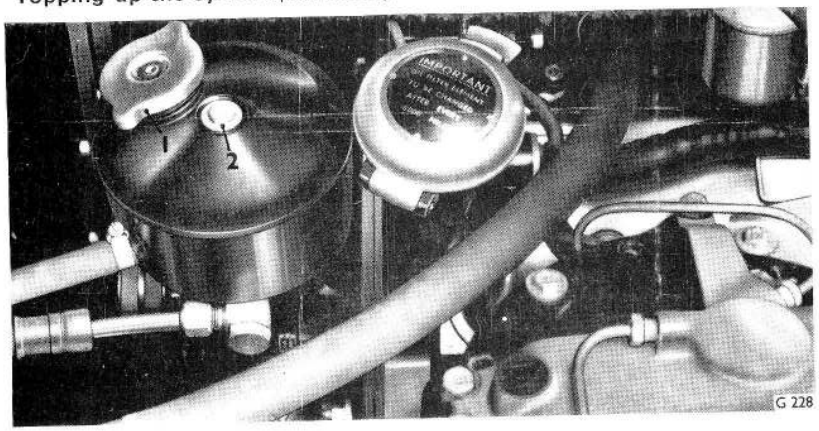


Fig 36 STEERING PUMP AND RESERVOIR

1 Reservoir filler cap 2 Reservoir cover set bolt

Unscrew the set-bolt securing the cover (see Fig. 36), remove the cover and spring, lift out the filter element and discard it. Fit a new element and refit the spring and cover. Check the cover seal for leaks when the pump is operating.

Belt adjustment

Every 6,000 miles, check the tension of each driving belt and adjust if necessary.

If there is a considerable difference in the tension of one belt in a pair fit a new matched pair of belts.

Correctly adjusted belts will deflect $\frac{3}{8}$ in. when a force of 8 lb. is applied at the centre of the run between the coolant pump and the power assisted steering pump (see Fig. 37). With experience, it is possible to check the belt tension without a spring balance by deflecting the belts using normal hand pressure. If an adjustment is necessary, slacken the pump securing screws located in the slotted bracket, move the pump as required then tighten the screws.

Steering ball joints

Every 12,000 miles, lubricate with an approved grease (see Page 58), the six grease nipples on the track rods and steering lever ball joints.

Steering idler box damper

Every 12,000 miles, inspect the external condition of the hydraulic damper and if a fluid leak is apparent, this should be rectified and the damper topped-up as required.

The fluid level/filler plug is positioned at the front of the damper. Before topping-up the damper, thoroughly clean the damper and filler plug. Remove the plug and top-up with fluid to the edge of the filler plug hole.

It is most important that only perfectly clean fluid of the correct grade is used and this should first be strained through a fine gauze. The importance of this cannot be over-emphasised, as a very small particle of foreign matter lodged under a valve would impair the effectiveness of the damper.

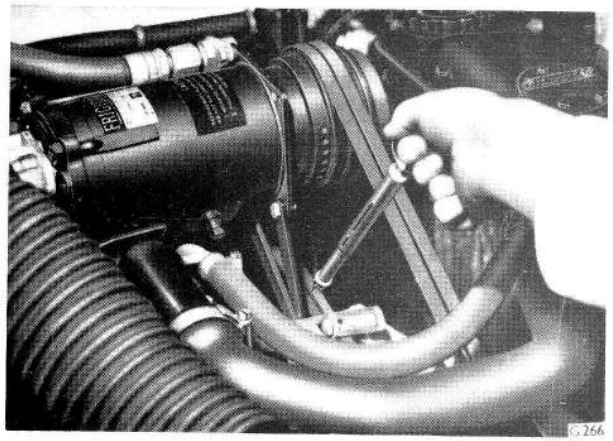


Fig 37 CHECKING THE TENSION OF THE STEERING PUMP BELTS

SUSPENSION

Front sub-frame and front suspension

The front sub-frame is manufactured from welded sheet steel and is mounted at four corners of the car body underframe using resilient metal mounts.

The independent front wheel suspension system comprises two upper and two lower triangle levers. Coil springs and double acting dampers are fitted between the body and the lower triangle levers. The inner ends of the upper and lower triangle levers pivot in rubber mounted bushes secured to the front sub-frame; the outer ends of the levers are connected to the stub axle yokes. Provision is made for the adjustment of castor and camber angles, the adjustment being carried out by fitting distance plates of different thicknesses between the inner mountings on the upper triangle levers and the front sub-frame.

The front suspension ball joints are sealed for life and no maintenance is required until renewal is necessary.

Front sub-frame and front suspension *(continued)*

No attempt should be made to remove the front suspension coil springs or the dampers without the special tool necessary for this operation.

Any adjustment or dismantling of the suspension should be carried out only by a Retailer.

Anti-roll bar

A transverse anti-roll bar, fitted at the forward end of the front sub-frame, is mounted in rubber blocks and is connected to the lower suspension levers by means of rubber lined ball joints. No attention to the anti-roll bar is necessary.

Transverse locating rod

One end of the transverse locating rod is joined to the body with a rubber bonded metal bush, just beneath the radiator and on the centre line of the car. The other end of the rod is flexibly mounted to a bracket fitted to the front sub-frame, adjacent to the body mounts on the front right-hand side.

The rod absorbs all the side loads on the front mounts when cornering, etc. Normally, no adjustment to this rod is necessary.

Rear sub-frame and rear suspension

The rear sub-frame is manufactured from welded sheet steel and is mounted to the car body underframe using resilient metal mounts. Three compliance dampers and two tubular steady links are mounted between the car body underframe and the rear sub-frame to control and restrain the movement of the sub-frame. The two outer dampers are resilient metal dampers and the centre damper is a double acting single tube hydraulic damper.

No attention is required except to inspect the external condition of the centre damper at each engine oil change period. If the damper shows any sign of oil leakage, it should be renewed by an Officially Appointed Retailer.

The independent rear wheel suspension system comprises two trailing arms with coil springs and double acting dampers fitted between the trailing arms and the strengthened spring pots in the body.

Shock dampers

The shock dampers are double acting sealed dampers. The front and rear shock dampers are similar in construction and operate on the same principle. No attention is required except to inspect the external condition of the dampers every 12,000 miles. If the dampers show any sign of oil leakage, they should be renewed by a Retailer.

Automatic height control system

In addition to the suspension system, a fully automatic hydraulic height control system is fitted to the car. The height control system maintains the standing height of the car under all weight and road conditions and in so doing, ensures optimum ride and handling characteristics.

A hydraulically operated height control ram is fitted between the body and the top of each of the location cups for the suspension coil springs. The supply of high pressure fluid to these rams is controlled by two height control valves at the rear and by a single height control valve and a roll restrictor valve at the front. The height control valves are mounted on the underbody of the car and connected by an operating arm to a moving part of the suspension. As the suspension moves up or down, the height control valve either allows pressurised fluid to enter the height control rams or allows the rams to exhaust the pressure so maintaining the standing height. The roll restrictor valve is fitted to the left-hand side of the engine compartment and meters the hydraulic fluid from the height control valve; this ensures that the roll rate does not exceed the design limitations of the suspension.

With the gear lever in any position except neutral, the system is on slow levelling, but whenever neutral is selected or a door is opened the system then changes to fast levelling. When fast levelling is in operation, any sudden change in the attitude of the car, caused by a passenger entering or leaving the car, or loading or unloading the luggage compartment, is instantly corrected so that the standing height remains unchanged. The fast/slow operation of the automatic height control system is controlled by a solenoid valve on the right-hand side of the rear sub-frame. This valve supplies hydraulic fluid to the height control valves at the rear, and the roll restrictor valve at the front.

The rear compartment of the brake reservoir supplies hydraulic fluid to the rear brake pump, which in turn supplies hydraulic fluid under pressure to the automatic height control system and to part of the braking system. If the pressure in this hydraulic circuit falls below the required pressure, the right-hand brake warning lamp will be illuminated. This lamp may be illuminated when switching on the ignition, especially after the car has been standing for a long period, but will be extinguished immediately the engine starts. Should the warning lamp be illuminated during a journey, this may be due to a failure in the high pressure hydraulic circuit. If the high pressure circuit fails, the automatic height control system will not operate and the car should be carefully driven to the nearest Retailer.

Maintenance

Every 12,000 miles, disconnect the ball joints on each height control valve operating rod, clean the joints, smear with grease (see Page 58) and reconnect the ball joints. Ensure that the length of each operating rod is not altered.

Check that the levelling system is operating satisfactorily and check the levelled height; re-set if necessary.

Hydraulic reservoirs

The reservoirs for the hydraulic circuits are located on the left-hand side of the engine as shown in Figure 29. Every month the level of fluid should be checked as described on Page 92. **It is important that only Castrol-Girling Amber Brake Fluid 1738 be used.** If frequent topping-up is necessary, examine the system for leaks and consult a Retailer.

WHEELS

The heavy gauge pressed steel wheels have well-base rims and are secured with five nuts. Right-hand wheel nuts have right-hand threads and left-hand wheel nuts have left-hand threads.

Front wheel bearings

The wheel bearings are packed with grease on initial assembly and require no further attention.

Wheel discs

When necessary, the stainless steel snap-on wheel discs should be removed with the tommy bar provided in the tool kit (see Fig. 38). Do not twist the tommy bar when removing a disc.

When removing a wheel disc it is advisable to place the tommy bar in one of the positions indicated by the arrows shown in Figure 38 noting the relationship between these arrows and the tyre valve, then give the tommy bar a sharp tap with the hand.

Fig 38 METHOD OF REMOVING A WHEEL DISC

The arrows indicate the most suitable positions for inserting the tommy bar.

Tyres

The low profile 8.45–15 tubeless tyres have been specially developed in conjunction with the tyre manufacturers. The carcase is constructed of Nylon and has a synthetic tread to provide maximum road adhesion consistent with good tyre life. Development work is always proceeding and when new tyres are required it is advisable to consult a Retailer who will be in a position to give the latest recommendations.

Whenever a new tubeless tyre is fitted, always ensure that a new snap-in valve is fitted also. This is necessary as the valve is made to last the life of the tyre and beyond this time, fatigue of the valve rubber body is likely to impair the air seal at the rim hole.

New tyres require a short period of running-in, therefore, it is recommended that after fitting a new tyre or tyres, hard cornering or sustained speeds of 90 m.p.h. and over should not be undertaken for at least the first 300 miles. During the running-in period, the 'ride' of the car may seem rather hard, but will improve as the tyre walls become more flexible.

Tyre pressures

The recommended tyre pressures are:

Front and rear 26 lb/sq. in. (1.83 kg/sq. cm.) cold.

For continuous high speed motorway driving the tyre pressures should be increased by 2 lb/sq. in. (0.14 kg/sq. cm.) i.e. to 28 lb/sq. in. (1.99 kg/sq. cm.) cold.

Every week, check the tyre pressures when the tyres are cold, preferably in the morning. Tyre pressures should not be checked when the tyres are hot. After a long period of sustained high-speed driving or, driving on hot roads, the tyres become heated and the pressure in them increases, but as the tyres cool the pressure decreases. Do not release air from hot tyres to adjust the pressure. Do not forget to check the pressure in the spare tyre.

Tyre valves

The tyre valves should give a long and trouble-free service provided that the following instructions are observed.

After checking the tyre pressures, ensure that the valve caps are refitted, as they not only protect the valve from the ingress of water, but also provide a valuable secondary air seal. The valve cap should be renewed if its rubber seal shows signs of wear.

Check the valve cores periodically and renew them if they tend to leak after moderate mileage or in extremes of climate.

Spare wheel

The spare wheel is mounted on a hinged platform beneath the left-hand side of the luggage compartment floor and can be lowered as described in Chapter 2.

An inflation trap for the spare tyre is provided in the floor of the luggage compartment, on the left-hand side. Lift the carpet and remove the rubber cover to gain access to the tyre valve.

Tyre service

Every 6,000 miles, the balance of each wheel should be checked and corrected if necessary. **The wheels should not be interchanged to give even tyre wear.**

All cars are now equipped with tubeless tyres, which have many advantages over tubed tyres. Should a puncture occur in a tubeless tyre as the result of penetration by a nail or other sharp object, provided that the object is left in the tyre it is usually possible to complete one's journey without having to effect a repair.

When a repair is necessary, it can be carried out with the aid of the Dunlop 'Reddiplug' repair kit.

The 'Reddiplug' method of repair is extremely simple and can be carried out without removing the tyre from the rim. Briefly, it consists of forcing a rubber plug through the puncture with a threading needle, an operation which can be completed in a matter of minutes. Full directions are given with each kit.

Wheel and tyre balance

On initial assembly, wheel and tyre units are dynamically and statically balanced with the aid of small weights clipped onto the inner and outer flanges of the road wheel. In view of the high road speeds attainable, it is recommended that wheel balance be checked every 6,000 miles.

As special equipment is required for checking and balancing wheels, this work should be carried out only by a Retailer or at one of the Service Stations in London or Crewe.

Care of tyres

In the interest of road safety, it is imperative that tyres are properly maintained and the following points are for your guidance.

Even at quite low speeds, tyres can be permanently damaged by driving over kerbs, hitting obstructions or potholes in the roadway, for example, when parking or on entering or leaving your garage.

Usually, damage or fracture of the casing will not be visible immediately but, later on it may lead to sudden tyre failure.

Periodically, remove stones and any other objects embedded in the tread rubber. Clean any oil or grease from the tyres.

Recommended tyre pressures must be maintained as under-inflation is still the most frequent cause of premature failure; it creates excessive flexing of the tyre walls and the internal heat developed weakens the tread and casing. Under-inflation also causes rapid tread wear. It is also important not to excessively over-inflate as this can make tyres more vulnerable to impact fractures. **Tyre pressures should be checked and corrected when COLD.**

Tyres with badly worn treads at any point are a hazard owing to the reduced tractability and aquaplaning on wet roads. Badly worn tyres also offer less resistance to punctures. If in doubt consult your nearest Retailer.

THE ELECTRICAL SYSTEM

The electrical system is negatively earthed; the negative side of the battery is connected to the body and all switching is through the positive side of the system with the exception of the electrically operated windows which are switched on the earth side (negative side) of the battery.

Before commencing work on the car which involves the electrical system, it is advisable to disconnect the negative lead from the battery terminal. Also, if it is ever necessary to give the battery a boost charge, it is advisable to disconnect the battery leads to prevent the possibility of damaging some of the electrical components.

BATTERY

The battery is mounted in the left-hand side of the luggage compartment and is easily accessible for servicing (see Fig. 12). To gain access to the battery, remove the trim from around the battery; the trim is secured by press stud clips. Unclip the webbing belt and lift off the cover complete with the small tools tray.

The following battery is approved for this car.

Dagenite Easifil Type 6RQ11.

It is a 12 volt battery and its normal charging current is 6 amperes.

Charging the battery

If necessary, the battery may be charged whilst in position in the car by means of the two pin plug socket in the rear left-hand side of the luggage compartment (see Fig. 9). To ensure that the current direction is correct, the sockets are marked '+' ve and '−' ve and in addition are of different sizes to indicate the plug fitting. A charging plug is supplied and is located in the small tools tray on top of the battery.

To check the condition of the battery

The condition of the battery can readily be checked by means of a hydrometer. The hydrometer is an instrument designed to measure the specific gravity of any liquid. As the specific gravity of the electrolyte varies according to the state of charge of the battery, the hydrometer provides a simple and rapid means of assessing the condition of the battery.

To check the condition of the battery *(continued)*

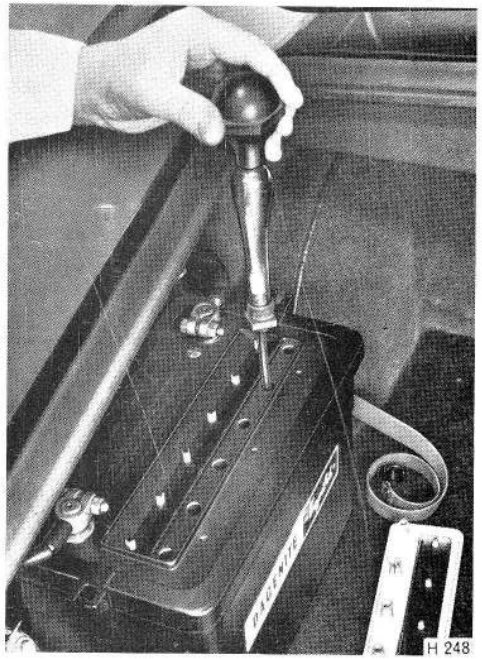


Fig 39
CHECKING THE SPECIFIC GRAVITY OF THE BATTERY

Although it is possible to check the specific gravity with the battery in position, access is easier if the battery connections are released and the battery drawn from its cradle.

The hydrometer should be used as follows.

Remove the cover from the filling trough to gain access to the cells.

Squeeze the bulb of the hydrometer and insert the rubber tube of the instrument into the electrolyte of one cell (see Fig. 39); an access hole to each cell is provided in the trough adjacent to the trough carrying the electrolyte level valves. Release the bulb so as to draw sufficient liquid into the hydrometer to lift the internal float off its seating. Withdraw the hydrometer from the electrolyte.

The specific gravity of the electrolyte may then be read directly from the float at the point where the graduated scale cuts the surface of the liquid.

Squeeze the bulb once more to return the electrolyte to the cell from which it was withdrawn.

Repeat this procedure for each cell, then compare the figures obtained with the table overleaf.

If the specific gravity of the electrolyte in one cell differs markedly from the others, then a defect must be suspected in that cell and the battery should be returned to your Retailer or to one of the Service Stations in London or Crewe.

Air temperature below 90°F. (32°C.)	
Specific gravity	**Condition of battery**
1.270 to 1.285	Fully charged
1.190	Half discharged
1.060	Fully discharged

Air temperature above 90°F. (32°C.)	
Specific gravity	**Condition of battery**
1.225 to 1.240	Fully charged
1.150	Half discharged
1.020	Fully discharged

Maintenance

The level of the battery electrolyte should be inspected regularly as, under normal operating conditions, the level of electrolyte in each cell will gradually fall due to evaporation losses.

Top-up the battery only when it is fully charged. If it is topped-up whilst discharged, the electrolyte will rise during charging and possibly flood the battery.

To check the level of the electrolyte, remove the trim and battery outer cover as previously described.

An indicator valve, which is square in section with white sides and black top, protrudes through the top of each cell and enables the electrolyte level to be checked by looking through the transparent section of the filling trough cover. Topping-up is required when the white sides of an indicator valve are below the base of the filling trough.

If topping-up is required in any cell, remove the cover from the filling trough and pour distilled water into the trough until it is full. Do not pour any water into the holes for checking the specific gravity of the electrolyte.

After topping-up, ensure that the filling trough cover is clean then fit the cover to the trough. The cover will press down on the indicator valves and allow an equal quantity of distilled water to enter each cell.

The top of the battery should always be kept clean and dry; attention should be given immediately to the slightest sign of corrosion on the terminals. Remove any corrosion with a rag moistened with a solution of ammonium carbonate, then liberally coat the terminals with petroleum jelly (not grease).

Maintenance *(continued)*

The battery must not be allowed to remain in a discharged condition. A battery which is not in service should be kept in good condition by fully charging it and then giving it a fresh charge at least once a month. It should be fully charged before being put back into service.

Always ensure that the battery is securely fastened in its cradle so that it cannot move.

Periodically, the breather pipe at the front of the battery box should be inspected and if necessary cleaned out to ensure adequate breathing of the battery.

GENERATOR

Cars without a refrigeration system

The generator is driven by the crankshaft pulley via two matched V belts. Any adjustment to the tension of these belts is carried out at the generator (see Page 69).

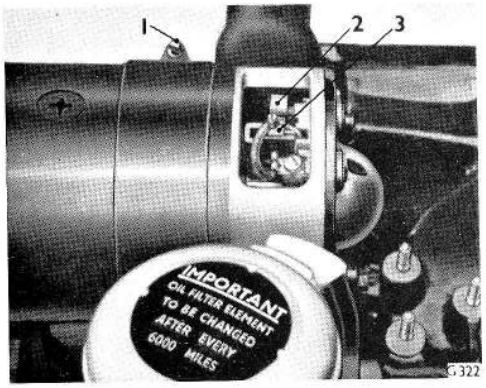


Fig 40
ACCESS TO THE GENERATOR BRUSHES

1 Cover securing screw
2 Brush tensioning spring
3 Brush

The output of the generator is regulated automatically relative to the condition of the battery, by the current/voltage regulator.

The generator has two external terminals; the smaller (field) terminal is connected to the voltage regulator terminal marked 'F'. The larger terminal is connected to terminal 'D' of the voltage regulator.

Every 24,000 miles (40000 Kms.), the commutator and brushes should be inspected after slackening the clamping screw and sliding aside the brush assembly cover (see Fig. 40). Remove any deposits of carbon dust and oil by means of a soft cloth moistened with petrol.

Take note of any appreciable wear of the brushes. Under normal circumstances, the brushes should require renewal only after a considerable period of running; premature failure or excessive wear of the brushes indicates a fault in the unit which should be returned to your Retailer or to one of the Service Stations in London or Crewe.

CURRENT/VOLTAGE REGULATOR AND CUT-OUT

Cars without a refrigeration system

The regulator unit comprises a cut-out relay, a current regulator and a voltage regulator, all mounted on a single base and enclosed in a dustproof cover. The complete unit is located in the engine compartment.

The function of the cut-out is to disconnect the circuit between the battery and the generator when the generator voltage falls below that of the battery; this prevents battery discharge through the generator.

The current regulator limits the generator output to a safe value when the battery is in a low state of charge or, when the load on the electrical system is high.

As the battery becomes fully charged, the regulator allows the charging current to drop to a 'trickle' charge rate.

ALTERNATOR

Cars fitted with a refrigeration system

The alternator is driven by the crankshaft pulley via two matched V belts. Any adjustment to the tension of these belts is carried out at the alternator (see Page 70).

The output of the alternator is regulated automatically by the alternator control, relative to the condition of the battery except when the battery is in a low state of charge. In this case, the self-regulating characteristics of the alternator govern the maximum output.

The alternator has four external terminals mounted on the rear face; three of the terminals are mounted in the plastic brush holder/cover at the top of the alternator and the other terminal marked 'AL' is mounted at the bottom.

The upper terminal on the plastic brush holder/cover has a yellow identification plate on which a red '+' ve sign is marked; this terminal is the output terminal and is connected to the ammeter. The lower Lucar terminal marked '+' ve on the plastic brush holder/cover is connected to the output terminal and also to the '+' ve terminal on the alternator control unit. The centre Lucar terminal on the cover is marked '—' ve and is connected to the 'F' terminal on the alternator control.

The Lucar terminal marked 'AL' at the bottom of the alternator is connected to the Lucar terminal marked 'AL' on the warning lamp simulator.

Every 24,000 miles (40000 Kms.) the brushes and slip rings should be examined as follows.

Before attempting to remove the connecting leads from the plastic brush holder/cover it is most important that the battery earth lead ('—' ve) is disconnected. If this is not done, there is a danger of an accidental short when removing the alternator leads and this would damage the alternator control beyond repair. Before proceeding any further, it will be necessary to remove the alternator from the engine as follows.

Alternator *(continued)*

Remove the setscrew, spring washer and spacing washer from the slotted adjuster link.

Unscrew the nut on the rear of the front pivot bolt then remove the bolt and plain washer.

Support the alternator and remove the nut and plain washer from the front of the rear pivot stud; withdraw the alternator from the stud taking care not to lose the plain washer and distance piece fitted behind the alternator rear mounting lug.

Before removing the alternator, disconnect the leads to the terminals on the plastic brush holder/cover taking careful note of their positions.

Remove the nut, washer, identification plate and the lock-nut from the upper terminal.

Remove the two screws together with the two washers and withdraw the brush holder/cover; ensure that the paper washer fitted beneath each screw hole does not drop into the alternator.

Remove any deposits of carbon dust and oil from the slip rings, using a soft cloth moistened in petrol.

If it is necessary to remove the brushes from the holder for cleaning or renewal, press in the tab on each Lucar connector and withdraw the brushes from the holders.

When fitting the brushes, ensure that the brush lead faces toward the large hole for the output terminal and after fitting, press out the tab of the Lucar connector. Also ensure that a paper washer is fitted beneath each screw hole in the brush holder/cover; if these are not fitted there is a danger of cracking the cover when tightening the screws.

Normally the brushes should require renewal only after a considerable running period; premature failure or excessive wear of the brushes indicates a definite fault in the unit which should be returned to your Retailer or to one of the Service Stations in London or Crewe.

ALTERNATOR CONTROL

Cars fitted with a refrigeration system

The alternator control is a transistorised unit with a printed circuit base. The unit is enclosed in a plastic cover and is located in the engine compartment as shown in Figure 16.

The function of the alternator control is to vary the alternator field current in order to maintain the stator output voltage within close limits. As the battery becomes fully charged, the alternator control allows the charging current to drop to a 'trickle' charge rate.

The design of the alternator control incorporates diodes which prevent the flow of current from the battery whenever the alternator output voltage falls below that of the battery; this prevents battery discharge through the alternator.

The alternator control can be adjusted for voltage only, and this operation should be carried out only by an experienced electrician. Any other fault which occurs will necessitate renewal of the control unit.

STARTER MOTOR AND CIRCUIT

Owing to the very heavy current required to operate the starter motor it has been necessary to fit a remotely controlled solenoid switch in the motor circuit. This is a heavy duty switch adjacent to the starter motor and is operated magnetically from the starter switch on the facia.

When the ignition key is turned fully clockwise, the main solenoid is energised and draws a plunger into the solenoid barrel against spring pressure; simultaneously an actuating lever causes the starter pinion to engage with the starter ring on the engine flywheel. As the plunger nears the end of its travel, the heavy duty moving contacts are closed and the starter motor is then energised.

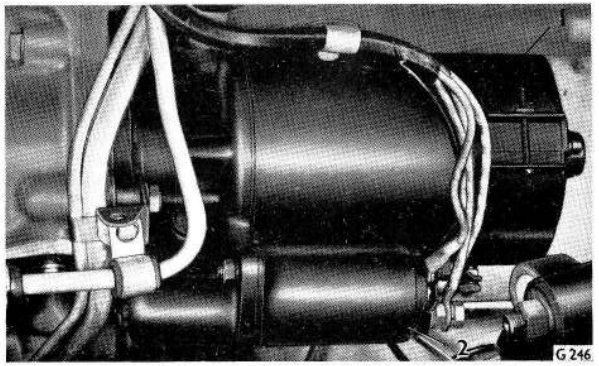


Fig 41 STARTER MOTOR

1 Access cover for brushes
2 Starter solenoid

If the starter motor appears to be sluggish in its action and the cause is traced to the battery and its connections, no further attempt should be made to use the starter motor until the battery and its connections have been checked. If no fault is apparent and the action is still sluggish, check the condition of the starter motor brushes and their holders; these should be cleaned with a soft cloth moistened with petrol.

To prevent the engine being started whilst the car is in gear, a micro-switch has been fitted; this isolates the starter motor should the gear lever remain in any position other than Neutral. Also, the parking lamp switch is connected in the starter motor circuit and the engine cannot be started unless this switch is in the centre position.

IGNITION SYSTEM

Coil

The Lucas high tension ignition coil is mounted on the induction manifold as shown in Figure 2.

To ensure that the leads are connected correctly, the coil terminals are marked. The terminal marked 'S.W.' or '+' is connected to the ballast resistance and the terminal marked 'C.B.' or '—' is connected to the contact breaker.

Should it be necessary to fit a new coil, it is most important that the replacement coil is of the correct polarity, i.e. suitable for negative earth return. It is also important to ensure that the 1 mfd. condenser, fitted to reduce electrical interference to the radio from the ignition system, is connected to the correct terminal. This is the terminal marked 'S.W.' or '+'.

The outside casing of the coil should be kept clean; misfiring can be caused by an accumulation of dirt around the terminals.

Ignition distributor

The distributor has twin contact breakers which are so arranged that their actions overlap. In this way, one set of contacts connects the low tension circuit, while the second set of contacts breaks the circuit to initiate the high tension spark.

The timing of the spark is controlled both centrifugally and by means of a vacuum operated diaphragm. This arrangement automatically advances the ignition as the engine speed increases, but a manual adjustment is also provided to compensate for differences in the quality of the fuels used.

This device, which is known as the octane selector, comprises an eccentric pin which should be turned anti-clockwise to retard the ignition for inferior fuels (see Fig. 42). Before the car is delivered, the octane selector is fully advanced, which is the correct setting for the specified fuel (see Page 23).

In countries where only fuel of inferior quality is obtainable, slacken the lock-nut then rotate the pin anti-clockwise by means of a screwdriver until a more satisfactory performance is obtained.

If at any time the distributor has been disturbed, it is important that any check or adjustment of the timing be carried out with the octane selector fully advanced. All timing operations should be carried out on the contact breaker set furthest from the vacuum advance unit.

Distributor maintenance

Every 6,000 miles, remove and clean the distributor cap. Use a soft dry cloth and pay particular attention to the areas between the terminals. Check that the carbon brush is present inside the cap and that it moves freely in its bore.

Withdraw the rotor arm and inject a few drops of clean engine oil into the distributor spindle. Do not remove or slacken the screw located in the spindle as a cavity is provided beneath it to lead the lubricant to the cam bearing. It is most important that the contact breaker points be kept free of oil when lubricating the distributor.

Lightly smear the faces of the cam with the approved grease.

Lubricate the centrifugal advance mechanism by injecting a few drops of thin machine oil through the contact breaker base plate.

Periodically examine the contact points for burning, pitting or pile. If the points are found to be in poor condition, they should be carefully cleaned using a fine carborundum stone, ensuring that the face of each contact remains square with the other.

Every 6,000 miles or after having cleaned the points, check the contact breaker gaps using the feeler gauge supplied in the tool kit; these gaps should be between 0.014 in. and 0.016 in.

Before adjusting the contacts and checking the ignition timing ensure that the ignition switch is 'off' and that the gear range selector lever is in the Neutral position. Pull off the protective cap from the starter switch positioned adjacent to the rear of 'A' bank cylinder head. Turn the engine over by means of the starter switch until the fibre heel of a contact breaker rests on the highest point of a cam lobe.

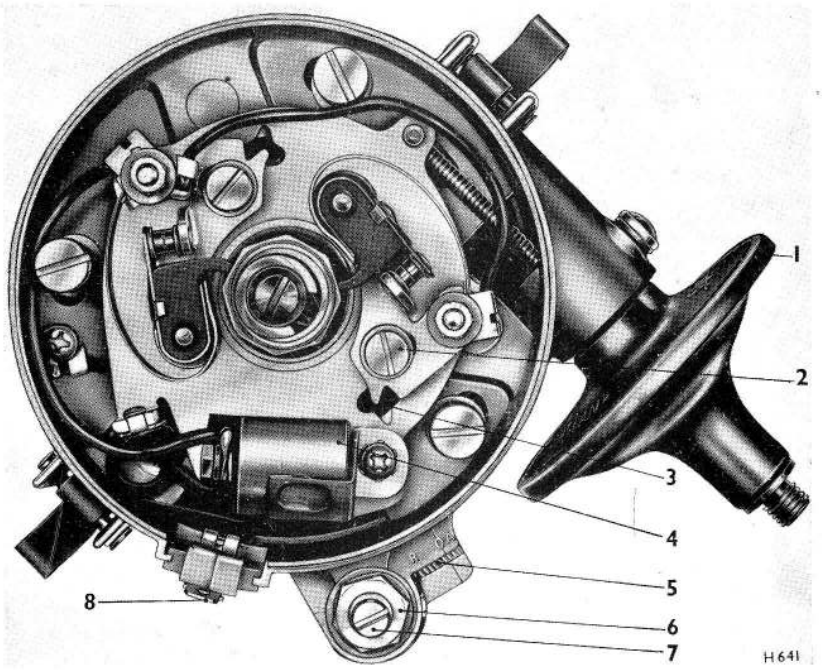


Fig 42 IGNITION DISTRIBUTOR

1 Vacuum advance unit
2 Locking screw
3 Adjusting slot
4 Condenser
5 Octane selector scale
6 Octane adjuster lock-nut
7 Octane adjuster
8 Low tension terminal

Distributor maintenance *(continued)*

Slacken the screw (2, Fig. 42) locking the stationary contact plate and re-position the plate by means of a screwdriver in the slot provided (3 Fig. 42). Adjust the plate until a gap of 0.014 in. to 0.016 in. is established between the contacts by means of feeler gauges.

Repeat this procedure with the second set of contacts, remembering first to turn the engine until the fibre heel of the second contact set rests on the highest point of a cam lobe.

After setting the points, check the ignition timing as follows.

Release the lock-nut on the octane selector and set the selector to the fully advanced position (A).

Note the A1 firing position on the distributor cap then remove the cap. Pull off the protective cap from the starter switch. Rotate the engine flywheel by means of the starter switch until the rotor is in the approximate A1 position.

Connect the leads of an ignition timing lamp to the contact breaker set furthest from the vacuum advance unit.

Remove the cover plate from the engine flywheel cover and turn the engine flywheel until the marking (2° before T.D.C.) is in line with the timing pointer. At this instant the contact breaker points should open as shown by the ignition timing lamp. If the ignition timing is incorrect, release the distributor clamping screw and slowly turn the distributor body until the points open as shown by the ignition timing lamp. During this operation lightly hold the top of the rotor against its normal direction of rotation; clockwise rotation of the distributor body will advance the timing and anti-clockwise rotation will retard the timing. After setting the ignition timing, tighten the distributor clamping screw.

Check the ignition timing as previously described after rotating the engine flywheel two complete revolutions. Push the protective cap over the starter switch.

Alternatively, the ignition timing can be checked with a stroboscope connected to A1 ignition circuit and should be 3° B.T.D.C. with the engine running at between 475 r.p.m. and 500 r.p.m. The timing pointer is positioned on the right-hand side of the crankshaft looking from the front of the engine.

SPARKING PLUGS

The sparking plugs approved for this car are Champion N.14.Y.

The sparking plugs are 14 mm. non-detachable plugs.

Every 6,000 miles, the plugs should be removed and cleaned. Before fitting the plugs, set the gaps with the aid of the feeler gauges supplied to 0.025 in. and lightly smear the threads with 'Graphogen' grease.

Every 12,000 miles, the plugs should be renewed to maintain satisfactory performance of the engine.

Sparking plug removal

The plugs are accessible from above and may be removed using the box spanner provided in the tool kit.

LIGHTING SYSTEM

Headlamps

The headlamps are controlled by three switches; the master switch on the facia, the flasher switch on the steering column and the footswitch provided for beam selection. A small warning lamp in the lower half of the speedometer and positioned between the two direction indicator warning lamps is illuminated whenever the headlamps are on main beam; this warning lamp may have either a blue or red lens depending on the type of speedometer fitted.

Four headlamps are fitted which are of the sealed beam type. The two inner lamps each contain a single filament placed at the focus of the reflector to provide long range illumination when switched to main beam. These lamps are extinguished when the headlamps are dipped. The two outer lamps each contain two filaments; one filament in each lamp is placed at the focus of the reflector to provide illumination at intermediate range on the nearside of the road, for driving with the headlamps dipped. The second filament in each lamp is displaced from the focus to provide short range 'flood' illumination in conjunction with the long range inner lamps when the headlamps are on main beam.

Headlamp dimming system (if fitted)

This system comes into operation automatically whenever the main lighting switch is turned to the 'S & T' position and the ignition is switched on. In this position, the side and tail lamps and also the dipped filament of each outer headlamp are illuminated; the current for the headlamps when the main lighting switch is in the 'S & T' position passes through a resistance and so reduces the brightness of the illumination and produces a dim dipped beam.

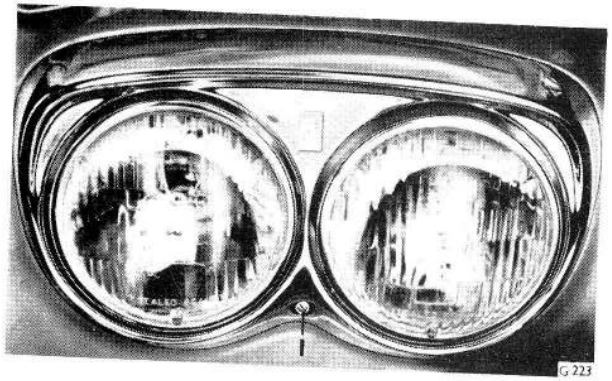


Fig 43 HEADLAMPS

1 Securing screw

Headlamp dimming system (if fitted) *(continued)*

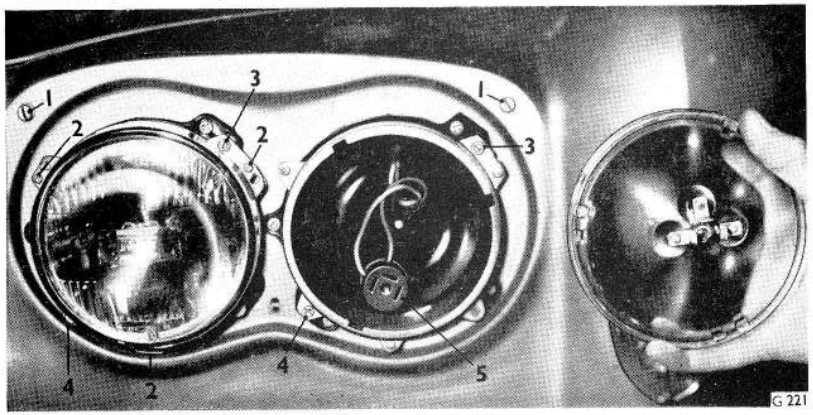


Fig 44 ACCESS TO THE SEALED BEAM UNITS

1 Location pegs
2 Securing screws
3 Vertical beam adjusting screw
4 Horizontal beam adjusting screw
5 Lamp socket

When the ignition is switched off, for example when parking with both side and tail lamps illuminated, the dimmed headlamp beams will be extinguished.

When the main lighting switch is turned to the 'H, S & T' position, a relay cuts out the dimmed circuit and the headlamps are supplied with the full current for both dipped and main filaments.

Headlamp safety circuits

The electrical circuits for the headlamps are so designed that if a failure occurs in one of the circuits while the headlamps are in operation, at least one headlamp will remain illuminated.

Travelling abroad

Regulations regarding headlamps and lighting, vary considerably from one country to another and Owners who intend travelling abroad are advised to consult their Retailer concerning the regulations which prevail in the country they intend to visit.

Owners in the United Kingdom who intend travelling on the Continent of Europe are advised to have Continental type headlamp units fitted prior to departure.

In France, yellow lamp units are the rule and although the regulations do not enforce motorists visiting the country to comply, it is nevertheless advisable as local motorists do not always appreciate that an offender is a tourist. Continental type headlamp units are available and Owners should consult their Retailer for details.

Changing a 'sealed beam' headlamp unit

Remove the single retaining screw from the chromium headlamp fairing, raise the lower edge of the fairing and unhook the fairing from the upper two retainers; the headlamp bezel retaining screws are now exposed.

Slacken by one half turn each of the three screws securing the headlamp bezel (see Fig. 44); turn the bezel so that the screw heads can pass through the enlarged end of the slots and the bezel can be removed. Ensure that the 'sealed beam' unit does not fall.

Withdraw the sealed beam unit and detach the connecting plug from the terminals at the rear of the unit (see Fig. 44).

The replacement unit should be fitted by reversing the procedure described above.

To ensure that the lamps are correctly paired, lamp units for the inner two lamps have '1' or '1A' inscribed on the lens. These are single filament units. Similarly, lamp units for the outer two lamps have '2', '2A' or 'EUROPEAN' inscribed on the lens and each contains two filaments.

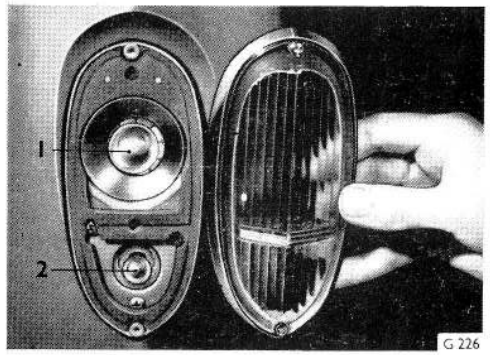
When the replacement unit has been fitted, no appreciable change should be apparent in the alignment of the headlamp beams. If in doubt, however, it is advisable to have the beams checked at the earliest opportunity by a Retailer or one of the Service Stations in London or Crewe.

Alignment and setting

Before the car leaves the factory, the headlamps are correctly aligned and due to the automatic height control system for adjusting the standing height of the car, it is not necessary for the headlamps to be adjusted to compensate for extra weight carried in the car. However, in the unlikely event of failure of the automatic height control system or whenever adjustment becomes necessary the headlamps can be rapidly adjusted as follows, noting that the engine should be running.

Fig 45 ACCESS TO THE SIDE/FLASHER LAMP BULBS

1 Flasher lamp bulb
2 Side lamp bulb



Alignment and setting *(continued)*

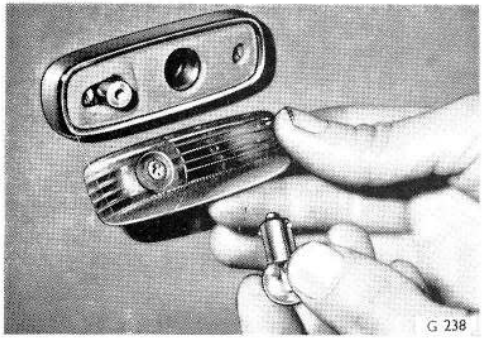


Fig 46
ACCESS TO THE REPEATER LAMP BULB

Remove the single retaining screw from the chromium headlamp fairing, raise the lower edge of the fairing and unhook the fairing from the upper two retainers; the beam adjusting screws are now exposed.

The vertical adjustment screw for each lamp unit is positioned high on the lamp surround (see Fig. 44). Turn the screw clockwise to raise the beam.

Should horizontal adjustment be necessary, it can be effected by means of the second adjusting screw, positioned at the side of the lamp. Turn the screw clockwise to move the beam towards the screw.

It is recommended that beam adjustment be carried out by your Retailer who has specialised beam setting equipment at his disposal.

Front side/flasher lamps

The front direction indicators are incorporated in the side lamps of the car. The two bulbs are screened from one another but are placed behind a common lens.

To gain access to the bulbs, unscrew the two lens retaining screws then withdraw the lens and rim (see Fig. 45). The bulbs are of standard bayonet fitting and spare bulbs are carried in the small tool box fitted on top of the battery.

Flasher repeater lamps

A flasher repeater lamp is fitted to the rear edge of each front wing and flashes in synchronism with the respective side and rear flasher lamps.

To renew a bulb, remove the Philips head screw and withdraw the lens. The bulb is of the standard bayonet fitting.

Fog lamp and spot lamp (if fitted)

When a matched pair of lamps are fitted, each lamp contains a single filament sealed beam unit.

To change a sealed beam unit, remove the screw which retains the rim of the lamp (see Fig. 47) and remove the rim taking care that the sealed beam unit does not fall. Remove the screw securing each terminal. Fit the new sealed beam unit by reversing this procedure.

Hazard system warning lamp and fuse (if fitted)

To change the bulb in the warning lamp, unscrew the chrome surround which contains the red lens. The bulb is retained in the rear of this surround and may be removed by pulling on the washer attached to the rear of the bulb. The bulb is a midget flange cap fitting.

A fuse box containing two fuses is positioned under the facia, directly above the headlamp dipping switch. The upper fuse protects the hazard warning circuit and the lower fuse protects the additional horns circuit (if fitted). If it is necessary to renew the upper fuse, and the lower fuse is not used to protect a circuit, this fuse may be used as a spare. **The fuses are Bulgin 25 amp. fuses and under no circumstances should the hazard warning circuit fuse be replaced by one of the spare 30 amp. fuses situated in the main fuse box.**

Fig 47 ACCESS TO THE FOG LAMP SEALED BEAM UNIT

1 Terminal screw 2 Terminal screw 3 Rim securing screw

Instrument and warning lamps

These lamps are fitted to the clock, speedometer, gear range indicator, oil pressure gauge, ammeter, fuel gauge, coolant temperature gauge, switchbox, warning lamp panel, hand brake warning lamp and the facia cigar lighter.

To renew a bulb on a facia instrument, loosen the upper trim roll fixing screws and raise the trim.

Remove the centre facia board and the upper portion of the steering column cowling (see 'Gear range indicator' in this Chapter).

Remove the outer facia board and withdraw the unit concerned.

After renewing the bulb, fit the facia and trim, reversing the procedure used for its removal.

For operation of the panel lamps switch refer to Chapter 1.

Gear range indicator

The gear range indicator at the top of the steering column is illuminated whenever the instrument lamps are turned on.

To gain access to the bulb for renewal, it is necessary to remove the upper section of the steering column cowl. The screws securing the upper section of the cowl are positioned on the underside of the steering column; the screws to be removed are the two at the rear and the outer two at the end nearest the steering wheel. It should be noted that the inner two screws at the end nearest to the steering wheel secure the gear range indicator switch and mechanism to the steering column and it is not necessary for these screws to be removed.

After removing the screws, lift the end of the cowl nearest to the steering wheel approximately half an inch to clear the steering wheel boss and withdraw the cowl lifting it at the same time to clear the switch mechanism.

Remove the screw at each end of the indicator scale and remove the indicator scale taking care not to damage the indicator needle. Move the gear range selector switch so that the indicator needle is in the extreme right or left-hand position. The bulb is now accessible and can be unscrewed from its holder.

Rear flasher, reversing and stop/tail lamps

The combination rear lamp contains a flasher lamp bulb in the top portion, a reversing lamp bulb in the centre and a stop/tail lamp in the lower portion. A reflector is fitted below the stop/tail lamp bulb.

To gain access to these bulbs, open the luggage compartment lid and pull the trim at the top edge; the trim is secured by a single press stud clip (see Fig. 48).

To renew one of these bulbs, withdraw the bulb socket concerned; the socket is held in position by a spring clip.

The bulbs are of standard bayonet fitting, the stop/tail lamp having a twin filament bulb and the remaining lamps having single filament bulbs.

Spare bulbs are carried in the small tool box fitted on top of the battery.

Bonnet lamp

To renew the bulb, raise the bonnet then remove the two screws securing the lamp lens. Withdraw the festoon bulb. For operation of the lamp refer to Chapter 1.

Facia compartment illumination/map lamp

To renew the bulb, remove the screw at each end of the lens and withdraw the lens; the festoon bulb can now be removed.

For operation of the lamp refer to Chapter 1.

Interior lamps

Four lamps are mounted in the roof and one is mounted in each rear door arm rest.

To renew a roof lamp bulb, withdraw the lamp bezel together with the lens; this unit is held in position by a spring clip at each end.

The front roof lamps each contain two festoon bulbs, while the rear roof lamps each have a festoon bulb in the rear half and a miniature bayonet fitting bulb in the front half.

To renew a bulb in a rear arm rest, remove two screws securing the white lens beneath the arm rest and remove the lens. Withdraw the double ended festoon bulb from its securing clips.

For operation of the interior lamps refer to Chapter 1.

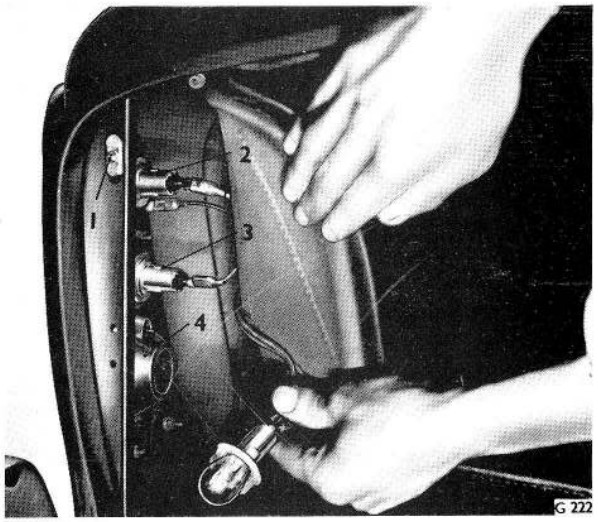


Fig 48 ACCESS TO THE REAR WING LAMP BULBS

1 Trim fastener
2 Flasher lamp bulb
3 Reversing lamp bulb
4 Stop/tail lamp

Ignition switch illumination

To change a faulty bulb, remove the two Philips headed screws securing the green lens positioned beneath the extended edge of the top roll. After removing the lens, slide the bulb holder towards the left-hand side of the car until it is possible to withdraw the bulb holder through the aperture. The bulb can then be unscrewed from it holder.

For operation of the lamp refer to Chapter 1.

Luggage compartment lamp

This illuminates the interior of the luggage compartment and is automatically switched on by a plunger switch whenever the lid is raised.

To gain access to the bulb, remove the lens of the lamp. The bulb is of the standard bayonet fitting.

Direction indicator signals

When the direction indicator switch is operated, a warning lamp in the appropriate side of the speedometer flashes in synchronism with the bulbs in the side, tail and repeater lamps. If the system is functioning correctly, the lamps flash approximately 90 times per minute. Should one of the flasher lamp bulbs in either the front, repeater or rear lamps fail however, the warning lamp will flash once only and then remain extinguished. The flasher lamp bulbs can be renewed as described previously for the side and tail lamps (see Pages 116 and 118).

The flasher unit is mounted in the main fuse box.

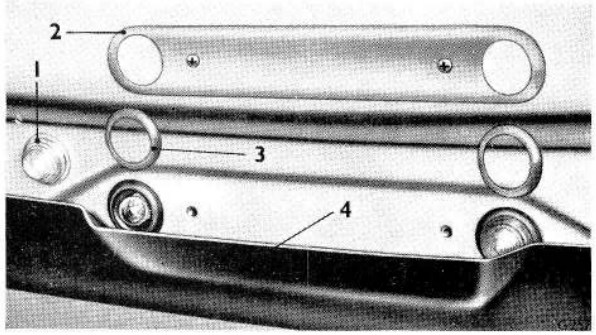


Fig 49 ACCESS TO THE NUMBER PLATE LAMP BULBS

1 Lens
2 Lens retaining plate
3 Cup washer
4 Rear bumper

Number plate lamps

Two lamps are mounted in the bumper fairing, immediately below the number plate and are illuminated whenever the main lighting switch is turned from the off position.

To renew a bulb, remove the two Philips headed screws securing the lamp retaining plate and remove the two cup washers and the retaining plate (see Fig. 49). Peel back the rubber cover retaining the glass lens of the faulty lamp and remove the lens. The bulb is now accessible from above and is of the standard bayonet fitting; alternatively, the rubber bulb holder may be pulled out of its location hole in the bumper fairing from underneath and the bulb removed.

Oil pressure indicator

The engine oil pressure indicator is mounted on the facia and is marked 'OIL'. The instrument is operated electrically by a semi-conductor transmitter unit fitted into the engine high pressure lubrication system; the transmitter unit is sealed and is non-adjustable.

Under normal running conditions, the indicator needle should register a pressure within the broad white band on the instrument scale.

Coolant temperature indicator

The engine coolant temperature indicator is mounted on the facia and is marked 'COOLANT'. The instrument is operated electrically by a semi-conductor transmitter unit fitted into the engine cooling system; the transmitter unit is sealed and is non-adjustable.

Under normal running conditions, the indicator needle should register a pressure within the broad white band on the instrument scale.

Electric horns

The twin Windtone horns are operated through a sealed relay mounted in the main relay box in the engine compartment.

No adjustment of the horns or relay is necessary or should be attempted. If servicing of these components seems to be required, consult a Retailer or one of the Service Stations in London or Crewe.

The horn fuse is positioned in the main fuse box as shown on the fuse box identification plate.

Fuses

The main fuse box is fitted below the facia on the driver's side of the car (see Fig. 4) and contains twenty fuses. The six bakelite fuses on the right of the fuse box each consists of **one strand** of No. 30 S.W.G. (0.0124 in. diameter) tinned copper wire of 22 ampere rating. The eight small glass fuses at the lower part of the fuse box are rated at 10 amps. continuous and the four larger glass fuses at the top of the fuse box and also the two glass fuses on the side of the fuse box nearest to the steering column are rated at 30 amps. continuous. The fuse box also contains a flasher unit, a thermal cut-out with manual re-set for the gearbox actuator and a thermal cut-out for the headlamp protection circuit; in addition, if a refrigeration unit is fitted the fuse box also contains seven diodes to prevent feed-back from the electric actuators.

To open the fuse box, unscrew the knurled screw at the top of the fuse box and lower down the hinged lid.

Fuses *(continued)*

When the lid is lowered, the fuse identification plate fitted between the lid and the fuse mounting plate can be withdrawn from its location.

Four spare glass fuses and a bobbin of fuse wire are fitted into location holes on the side of the fuse box facing the steering column and are securely held in position by spring clips; two of the glass fuses are rated at 10 amp. continuous and the other two are rated at 30 amp. continuous. **It is important to note that if additional glass fuses are required they should be of Bulgin manufacture only and of the correct rating.**

RADIO

The following radio receivers are standard equipment.

Radiomobile 980VT

Medium and long wave receiver.

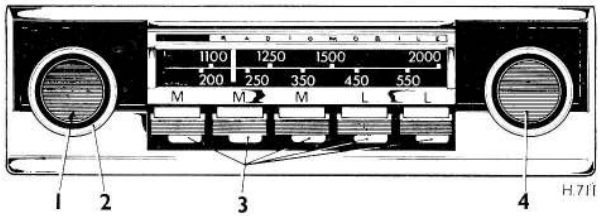


Fig 50 RADIO CONTROLS – MEDIUM AND LONG WAVE RECEIVER

1 Volume control and on/off switch
2 Tone control
3 Tuning buttons
4 Manual tuning control

The receiver is fully transistorised and is designed for medium and long wave reception and an external aerial is normally fitted.

Mechanically pre-set push button tuning is provided in addition to the normal manual control (see Fig. 50).

The combined 'on/off' switch and volume control is situated to the left of the five push buttons. To switch on the receiver, turn the control clockwise; further rotation of the control progressively increases the volume. Turning the control fully anti-clockwise will switch off the receiver.

The tone control is concentric with the combined 'on/off' and volume control switch and provides continuously variable tone correction.

With the tone control turned anti-clockwise, the amount of bass reproduction is reduced. When the control is turned to its central position, no correction is applied and with the control turned clockwise, the amount of treble reproduction is reduced.

The manual tuning control is situated to the right of the push buttons and provides completely variable station selection. The control is permanently engaged.

The five tuning push buttons provide automatic tuning of five stations, pre-selected from the medium and long wavebands. Waveband changing for any pre-selected station is automatically effected when a button is pressed.

The two push buttons on the right of the receiver control stations on the long waveband and the three remaining push buttons control stations on the medium waveband. To change to the long waveband when tuning manually, press either of the two push buttons on the right of the receiver. To change to the medium waveband, press any of the three remaining push buttons.

The tuning scale is divided into two sections, medium wave and long wave, and is calibrated in wavelengths (metres). The wavelength indicator needle moves horizontally and the tuning scale is illuminated by 'edge-lighting'.

Setting the tuning push buttons

Switch on the receiver; as the receiver is fully transistorised, no 'warm-up' period is required.

Select the waveband required by pressing the appropriate push button, then tune in the required station by means of the manual tuning control (see Fig. 50). With the station accurately tuned in, withdraw the button to its fullest extent ($\frac{1}{4}$ in. movement) to release the locking mechanism, then push the button firmly 'home', thus locking the mechanism in the required position. The button is now set to tune the pre-selected station and when pressed, will 'bring-in' the station irrespective of the position to which the scale pointer has been previously adjusted.

Proceed in the same manner with the remaining buttons.

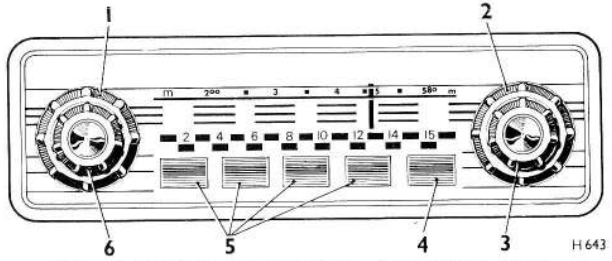


Fig 51 RADIO CONTROLS – MEDIUM AND SHORT WAVE RECEIVER

1 Tone control
2 Group selection switch
3 Tuning control
4 Short or medium wave push button
5 Short wave push buttons
6 Volume control and on/off switch

Philips N6X16T

Medium and short wave receiver.

The receiver covers one medium waveband and nine short wave ranges.

With the group selection switch (see Fig. 51) turned clockwise, the push buttons, reading from left to right, control the following short wave

Radio *(continued)*

ranges, 16, 19, 25, 31 and 41; with the group selection switch turned anti-clockwise, the push buttons control 49, 60, 75, 90 short wave ranges and the last push button on the right controls medium waveband selection.

After selecting the required range, the receiver should be tuned manually.

The on/off switch and volume control, tone control and manual tuning control operate in the same way as described for the Radiomobile 980VT receiver.

Pye PE2000T

Medium wave receiver.

The receiver is fully transistorised and covers the medium waveband and an external aerial is normally fitted.

Mechanically pre-set push button tuning is provided in addition to the normal manual control, but the five buttons all control stations on the medium waveband.

The setting of the tuning buttons and manipulation of the controls are carried out as previously described for the Radiomobile 980VT receiver.

Rear compartment loudspeaker

In order to improve the quality of sound reproduction in the rear of the car, an additional loudspeaker is fitted in the parcel shelf below the rear window.

A balance control, mounted on the left of the receiver, is provided to vary the proportion of volume between the front and rear loudspeakers. The overall volume of sound is controlled from the receiver panel as previously described.

Radio fuse

A 5 amp. cartridge fuse is fitted in the receiver supply lead and is housed in a plastic container clipped to the right-hand side of the receiver.

To gain access to the fuse, pull off the two knobs on the control spindle on each side of the receiver, remove the lock-nut on each spindle and then withdraw the receiver finisher. Remove the two screws securing the receiver trim to the under facia, lower down the rear of the trim and at the same time withdraw the front of the trim until it is clear of the receiver control spindles. The trim should then be supported at a suitable height so that the leads to the aerial switch and loudspeaker balance control are not too tight; alternatively, the leads may be disconnected. To remove the fuse from its container, pull the container from its clips, depress one end of the container against spring pressure and twist it anti-clockwise; remove the fuse.

If further advice or assistance in connection with the receiver equipment is required, consult a Retailer or one of the Service Stations in London or Crewe. If it is more convenient consult the appropriate radio Service Depot.

Aerial

The aerial is electrically operated and is mounted on the right-hand front wing. The aerial is controlled by a self-centring switch on the right-hand side of the receiver and the aerial may be raised or lowered by operating this switch.

It is unlikely that the aerial will need any attention, but to ensure the best reception, it should be kept clean.

WINDSCREEN WASHING

An electrically operated windscreen washer enables the driver to wash the windscreen whilst driving the car. Operation of the washer is described in Chapter 1.

If a jet becomes obstructed by foreign matter, it may readily be cleared by slackening the knurled screw on the jet and operating the windscreen washer; the jet consists of a small slot which becomes exposed when the screw is slackened and any obstruction is therefore easily washed away.

Adjustment of the angle of the jet is effected by turning the hexagon portion of the jet with a spanner. Fluid from the jet should impinge on the windscreen towards the top of the arc traversed by the wiper blades.

The reservoir (see Fig. 52) should be filled with a special windscreen washing fluid; supplies of fluid in concentrated form can be obtained from any Retailer.

The liquid has a low surface tension and anti-freeze properties and should be diluted with distilled water as directed on the bottle of concentrate.

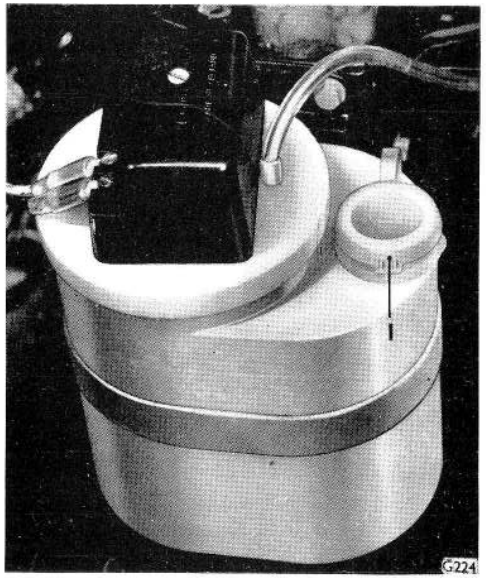


Fig 52 WINDSCREEN WASHER RESERVOIR

1 Filler cap

ELECTRICALLY OPERATED WINDOWS

The electrically operated windows are controlled by self-centring switches conveniently mounted on each door and the operation of these switches is described in Chapter 1.

Each window motor is provided with a thermostatically controlled cut-out which safeguards the motor against possible damage resulting from overheating. If the switch is held in the operating position for more than a few seconds after the window has reached the fully open or fully closed position, the cut-out will temporarily break the circuit. It is also possible that the driver and passenger may inadvertently operate the respective switches simultaneously in order to select opposite directions of travel for the same window; if this happens, the window will remain stationary and after a few seconds, the cut-out will break the circuit to protect the motor. After approximately 20 seconds, the cut-out will cool and the circuit will be automatically restored.

A set of four fuses is situated in the main fuse box mounted just below the right-hand side of the facia; these fuses are positioned at the top of the fuse box, as shown on the fuse identification plate, and are Bulgin glass fuses rated at 30 amp. continuous. Two spare fuses are provided in the side of the fuse box facing the steering column; these fuses are held in the location holes by spring clips.

ELECTRICALLY OPERATED FRONT SEATS

The electrically operated front seats are controlled by self-centring eight position switches conveniently mounted between the seats; operation of the switches is described in Chapter 1.

Each front seat electric motor is provided with a thermostatically controlled cut-out which safeguards the motor against possible damage resulting from overheating. In addition, the seat motor circuits are provided with two fuses positioned on the side of the main fuse box facing the steering column; these fuses are Bulgin glass fuses rated at 30 amp. continuous. Two spare fuses are provided also on the side of the fuse box; these fuses are held in the location holes by spring clips.

ELECTRICAL FAULT LOCATION

In the event of a fault in the electrical system being suspected, investigate as follows:

Fuses

Check the fuses; failure of any section of the system may be due to a 'blown' fuse. Spare fuse wire and fuses are provided within the fuse box.

Relays

If the faulty circuit contains a relay the relay should be checked for correct functioning by a skilled electrician.

Ignition

If, with the fuses intact and the battery in a charged condition, the ignition

(a) misses:

(i) Check the condition of the sparking plugs. If necessary, clean them and adjust the gaps (see Page 112).

(ii) Check the condition of the contact breaker points. If they are burnt or pitted, clean them, adjust the gaps and check the ignition timing (see Page 111).

(iii) Check the condition of the H.T. ignition circuit, removing any grease or dust from inside the distributor cap and from the coil and cables.

(b) fails:

(i) Check as described above.

(ii) Check for voltage at the 'S.W.' or '+' terminal of the coil; the voltage at this terminal should be 7 volts. If no voltage is evident, the wiring should be checked. If there is adequate voltage at the 'S.W.' or '+' terminal a check should be made at the 'C.B.' or '−' side of the coil; if there is no voltage at this terminal when the distributor contacts are open, the coil should be renewed.

Battery

If the battery will not retain its charge:

(i) Check the condition of the battery electrolyte (see Page 105).

(ii) Ensure that there is no short circuit in the system as follows: Remove the clock/roof lamps fuse from the fuse box and ensure that all switches are in the 'off' position. Disconnect the positive lead from the battery and connect a voltmeter between this lead and the battery terminal (connect the positive lead of the voltmeter to the positive terminal of the battery). Any reading thus obtained on the voltmeter will indicate a short circuit in the system and the car should be returned to a Retailer or one of the Service Stations at London or Crewe for further investigation. Ensure that no circuit is switched on, or accessories in excessive use when the engine is not running.

Starter motor

If, with the battery in a fully charged condition, the starter motor:

(a) Is sluggish or fails to turn the engine, check the electrical connections for security. Also check the condition of the motor brushes and their holders. If necessary, clean the brushes and holders with a cloth moistened with petrol.

(b) Operates without turning the engine, check the electrical connections. If they are secure, the trouble lies in the starter drive; in this case consult a Retailer or one of the Service Stations in London or Crewe.

Generator or alternator

If the ammeter fails to show a 'charge' reading when the engine is running, check whether the ammeter shows a 'discharge' reading when the headlamps are switched on and the engine is stationary. If the ammeter shows no such deflection, the instrument or its wiring is at fault.

If the ignition warning lamp is illuminated when the engine is running at more than idling speed, check the tension of the belts driving the generator (or alternator) (see Page 69).

If a fault is suspected in the generator (or alternator), consult a Retailer or one of the Service Stations in London or Crewe.

Regulator or alternator control

If the generator (or alternator) is in order and the regulator (or alternator control) is therefore suspect, no attempt should be made to adjust it. Consult a Retailer or one of the Service Stations in London or Crewe.

LAMP UNITS

Headlamps

Note: 1A lamp units are fitted to the inner two lamps.
2 or 2A lamp units are fitted to the outer two lamps.

Location		*Rating*	*Colour*	*Fitting*
United Kingdom	1A	12V 50W	Clear	Push-in two blade
	2A	12V 37½/50W	Clear	Push-in three blade
Middle and Far East	1A	12V 37½W	Clear	Push-in two blade
	2 or 2A	12V 37½/50W	Clear	Push-in three blade

Bulbs

Foglamp and spotlamp	12V 50W	Clear	Sealed beam—screw terminals
Front side lamps	12V 6W	Clear	M.C.C. bayonet
Front flasher lamp	12V 21W	Clear	S.C.C. bayonet
Rear stop/tail lamp	12V 21/6W	Clear	S.B.C. bayonet
Rear flasher lamp	12V 21W	Clear	S.C.C. bayonet
Reversing lamps	12V 21W	Clear	S.C.C. bayonet
Number plate lamp	12V 6W	Clear	M.C.C. bayonet
Luggage compartment lamp	12V 6W	Clear	M.C.C. bayonet
Bonnet lamp	12V 6W	Clear	Double ended festoon
Facia compartment illumination/map lamp	12V 6W	Clear	Double ended festoon
Rear arm rest lamp	12V 6W	Clear	Double ended festoon
Roof lamps	12V 6W	Clear	Double ended festoon
Reading lamp incorporated in each rear roof lamp	12V 4W	Clear	M.C.C. bayonet
Ignition switch illumination	12V 1.5W	Clear	L.E.S. screw

	Rating	*Colour*	*Fitting*
Speedometer			
Illumination	12V 2.2W	Clear	M.C.C bayonet
Flasher warning lamps	12V 2.2W	Clear	M.C.C. bayonet
Headlamp main beam	12V 2.2W	Clear	M.C.C. bayonet
Clock illumination	12V 2.2W	Clear	M.C.C. bayonet
Cigar lighter	12V 2.2W	Clear	M.C.C bayonet
Switchbox			
Ignition warning lamp	16V 3W	Clear	M.E.S. screw
Oil pressure warning lamp	16V 3W	Clear	M.E.S. screw
Gear range indicator	12V 1W	Clear	L.E.S. screw
Warning lamp panel			
Fuel warning lamp	12V 2.2W	Clear	M.C.C. bayonet
Coolant warning lamp	12V 2.2W	Clear	M.C.C. bayonet
Accumulator warning lamps	12V 2.2W	Clear	M.C.C. bayonet
Warning lamp—hand brake/stop lamp bulb failure	12V 2.2W	Clear	M.C.C. bayonet
Fuel/oil level gauge	12V 2.2W	Clear	M.C.C. bayonet
Coolant temperature gauge	12V 2.2W	Clear	M.C.C. bayonet
Ammeter	12V 2.2W	Clear	M.C.C. bayonet
Oil pressure gauge	12V 2.2W	Clear	M.C.C. bayonet
Flasher repeater lamps	12V 4W	Clear	M.C.C. bayonet
Radio	12V 1.5W	Clear	L.E.S. screw
Hazard warning lamp	12V 1.5W	Clear	Midget flange cap

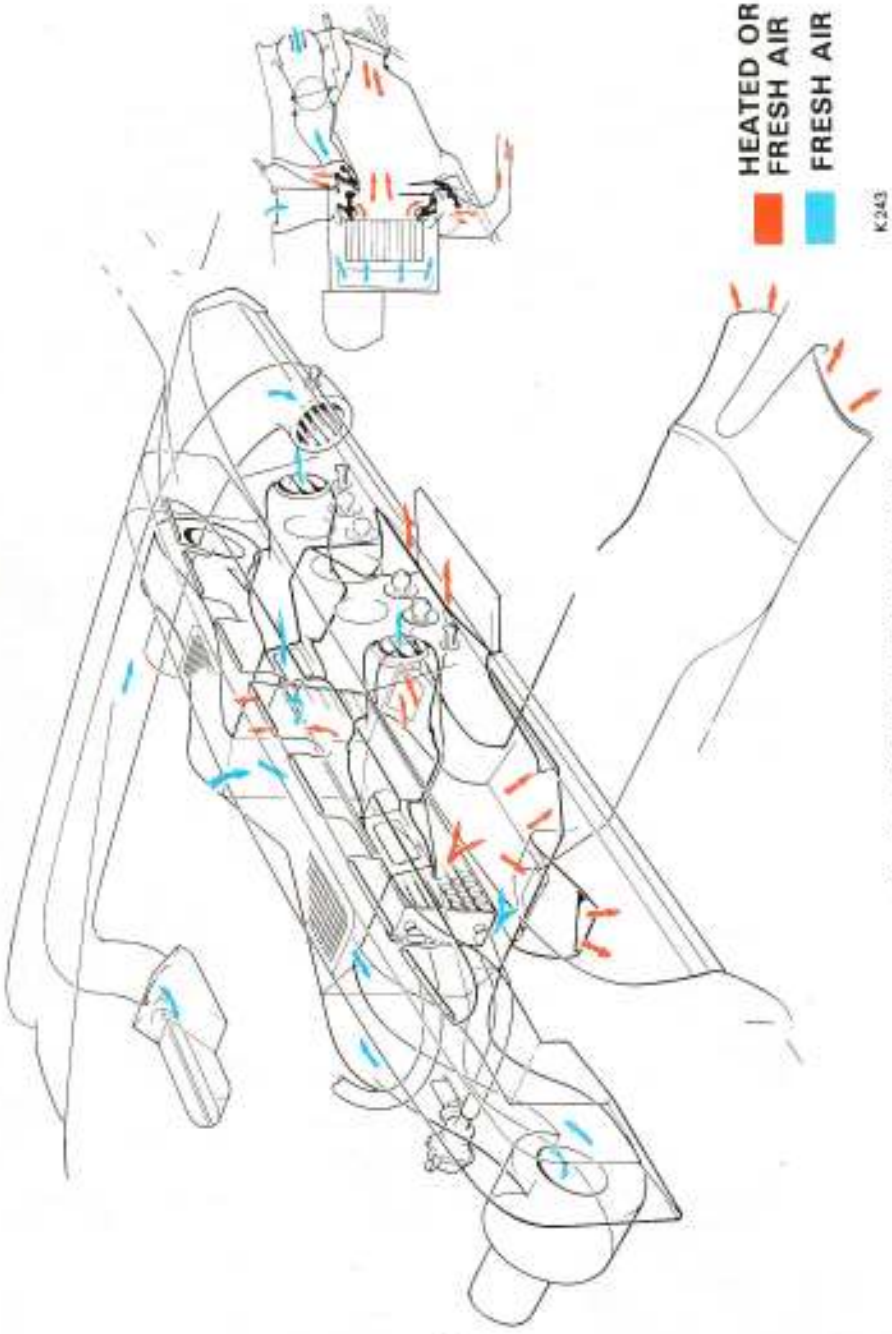


Fig 53 AIR CIRCULATION DIAGRAM

AIR CONDITIONING

An efficient heating and ventilation system is a standard installation in this car, but a refrigeration system may have been fitted as an extra to cool the car interior.

In order that the Owner may fully understand the operation of the system installed in his car, each system is described separately.

HEATING AND VENTILATION

A heating and ventilation unit mounted below the centre of the front scuttle delivers fresh air in the desired temperature range through concealed ducting into the car interior.

The complete system can itself be considered as three independent systems (see Fig. 53). The upper system, controlled by the 'UPPER' switch supplies air to the ducts at the base of the windscreen while the lower system, controlled by the 'LOWER' switch, supplies air to the lower outlets; the ventilation system supplies fresh air to the circular outlet ducts on the facia and the outlet in the centre of the facia when the flap is opened and both the 'UPPER' and 'LOWER' switches are in the fresh air position. Also, additional fresh air is available from the outlet grille in the driver's scuttle wall.

For the heating and ventilation unit mounted below the scuttle, fresh air is admitted through an intake grille in the top of the scuttle and is filtered through a urethane foam element. If so desired, the air can be boosted, by two blower motors operated by a five position switch below the main facia (see Figs. 3 and 54).

If unheated or fresh air is required, the intake air enters the car interior through the two circular outlet ducts on the facia and also through the outlet in the centre of the facia when the flap is lowered; each circular outlet duct has an internal flap valve operated by a cable which is connected to a withdrawal knob positioned below each duct. As the knob is withdrawn, the quantity of air entering the car is increased. The circular outlet ducts can be swivelled to almost any position to direct air as required. The outlet duct in the centre of the facia can be opened by pulling the handle shown in Figure 3.

Heating and ventilation *(continued)*

It should be noted that the circular outlet ducts on the facia will supply fresh or unheated air only; if desired, this air can be boosted by the blower motors.

If necessary, fresh air can be obtained through either system ducting when the switch for that system is withdrawn in the fresh air position (see Fig. 54). Also, the air may be boosted by operating the blower motors.

Fresh air can also be admitted to the car through the outlet grille in the driver's side scuttle wall; the grille is connected by a duct to an intake grille in the driver's side front wing and air enters the grille by ram effect only, induced by the forward movement of the car. The outlet grille in the scuttle wall has a flap valve, which is cable operated by a withdrawal knob on the facia. It should be noted that unheated air only is available through this duct.

When heated air is required, either the 'UPPER' or 'LOWER' switch, or both switches should be turned clockwise until the required temperature is obtained; there are four clockwise positions and the temperature of the air will be increased as each switch is turned progressively clockwise. The switches are mounted on the facia as shown in Figure 3 and are marked 'UPPER' and 'LOWER'. Also, each switch has three withdrawal positions

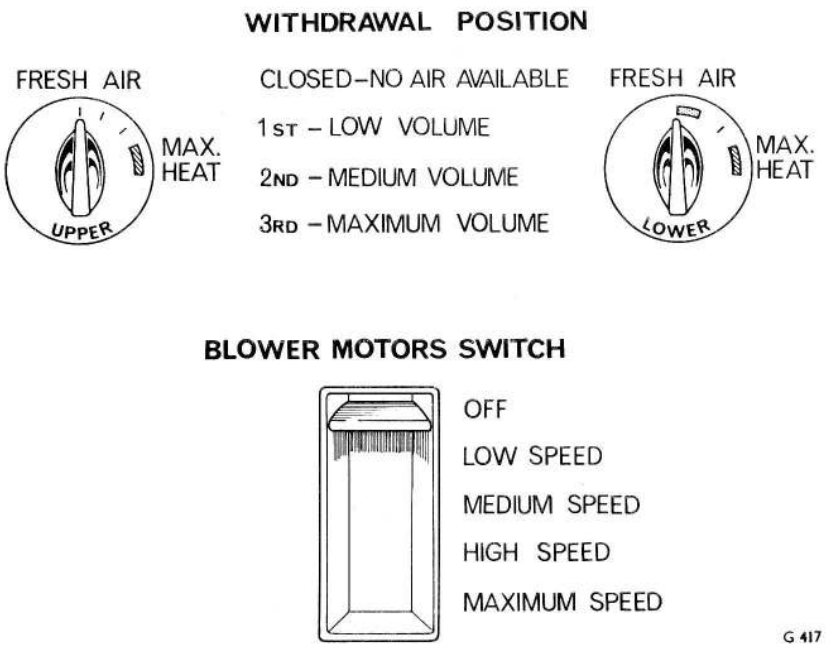


Fig 54 AIR CONDITIONING SWITCH POSITIONS (CARS WITHOUT A REFRIGERATION SYSTEM)

in any rotary position; the quantity of fresh or heated air available at the outlet ducts is increased as the switches are progressively withdrawn. The effect of each switch position is shown in Figure 54.

The upper system supplies fresh or heated air to the ducts at the base of the windscreen only, and if necessary, the full volume of air drawn into the air conditioning unit may be directed onto the windscreen by operating the 'UPPER' switch with the 'LOWER' switch fully depressed.

The lower system supplies fresh or heated air to the front compartment through the ducts below the facia and to the rear compartment through the ducts over the transmission tunnel at the rear of the front seats. If necessary, the full volume of air drawn into the air conditioning unit may be directed to the lower system outlet ducts by operating the 'LOWER' switch with the 'UPPER' switch fully depressed.

When the flap covering the central duct in the facia is lowered and either the upper or lower systems are providing heated air, hot air will also be available through this duct, although this is not its main purpose. If maximum heating is required, the flap should be closed otherwise the efficiency will be reduced. The primary purpose of the duct is to provide unheated or fresh air.

Maintenance

Every 12,000 miles, check that all the controls for the heating and ventilation systems are operating satisfactorily. Also, renew the foam filter element fitted beneath the scuttle intake grille. To remove the element, unscrew the five setscrews securing the intake grille, raise the grille, pull the windscreen washer tube from the jet connector and remove the grille; withdraw the foam element. Fit the new element by reversing this procedure.

Rear window demister

The rear window is demisted by means of an electric heating element sandwiched between the layers of glass comprising the window. The demister is controlled by a switch on the facia, adjacent to the steering column (see Fig. 4).

If in doubt as to whether the demister is operating, switch on the ignition without starting the engine, and switch on the rear window demister. If it is operating, the ammeter should show a small discharge equivalent to the current flowing through the element.

REFRIGERATION SYSTEM (IF FITTED)

The refrigeration system is a fully recirculatory system and the cooling unit (the evaporator) has to cool only the air which has in earlier cycles already been reduced to a lower temperature.

It is most important that Neutral be selected when the engine must be idled for long periods during hot weather with the refrigeration system on. Under these conditions, the engine idling speed is increased to ensure efficient cooling of the engine and improved operation of the refrigeration system.

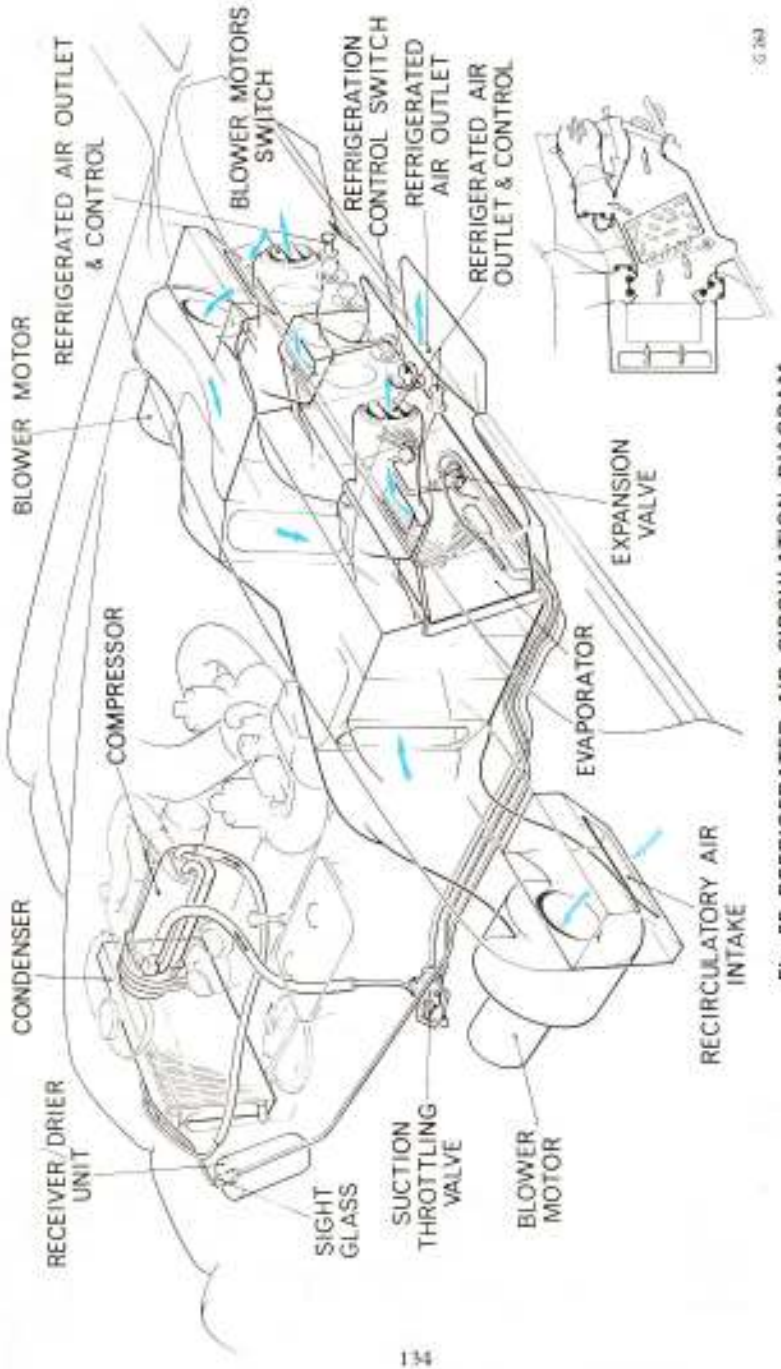


Fig 55 REFRIGERATED AIR CIRCULATION DIAGRAM

Refrigeration system (if fitted) *(continued)*

The refrigeration system ensures comfort for the occupants of the car in all climatic conditions and in addition to cooling the air, it removes moisture by condensation in the cooling unit (the evaporator).

Since cool air is available within the car interior, it is not necessary to open the windows during hot weather and passengers can travel free from draughts, noise and the ingress of dust etc. Indeed, it is recommended that the windows be kept closed to assist the refrigeration system to function efficiently.

The ducting fitted to a car with refrigeration is similar to that normally fitted, except that an additional air intake for the recirculatory system is fitted in the interior of the car on each side of the bulkhead; each of these intakes is covered with a metal grille.

The cooling unit (the evaporator) is mounted at the rear of the main heating unit.

Under normal operating conditions, a certain amount of moisture from the air passing through the evaporator condenses and drips through drain tubes to the area below the bell housing of the engine; this is a perfectly normal function.

The control for the refrigeration system is the switch marked 'UPPER' on the facia. This switch, in addition to having the four clockwise positions for the upper heating and ventilation system, also has four positions anti-clockwise for the refrigeration system.

Clockwise operation of the 'UPPER' switch is the same as described for a car without refrigeration and operation of the blower motors is the same as shown in Figure 54.

It should be noted that when the 'UPPER' switch is turned to any position anti-clockwise, heating will not be available in any system as this switch overrides all other systems. Although this switch may be withdrawn three positions, when turned to any anti-clockwise position, it has no effect on the air available.

When it is required to use the refrigeration system, it is necessary to start the engine as the refrigerant compressor is driven by the engine. After starting the engine, turn the 'UPPER' switch to the required anti-clockwise position (see Fig. 57); this operation will engage the refrigerant compressor clutch. The temperature of the air supplied to the car interior is reduced as the 'UPPER' switch is moved progressively anti-clockwise. As the system is fully recirculatory, the blower motors switch should be moved down to the required position to recirculate the air.

The intakes for the recirculatory system are positioned on the bulkhead, just below the facia, one on each side of the car; each intake is covered with a metal grille.

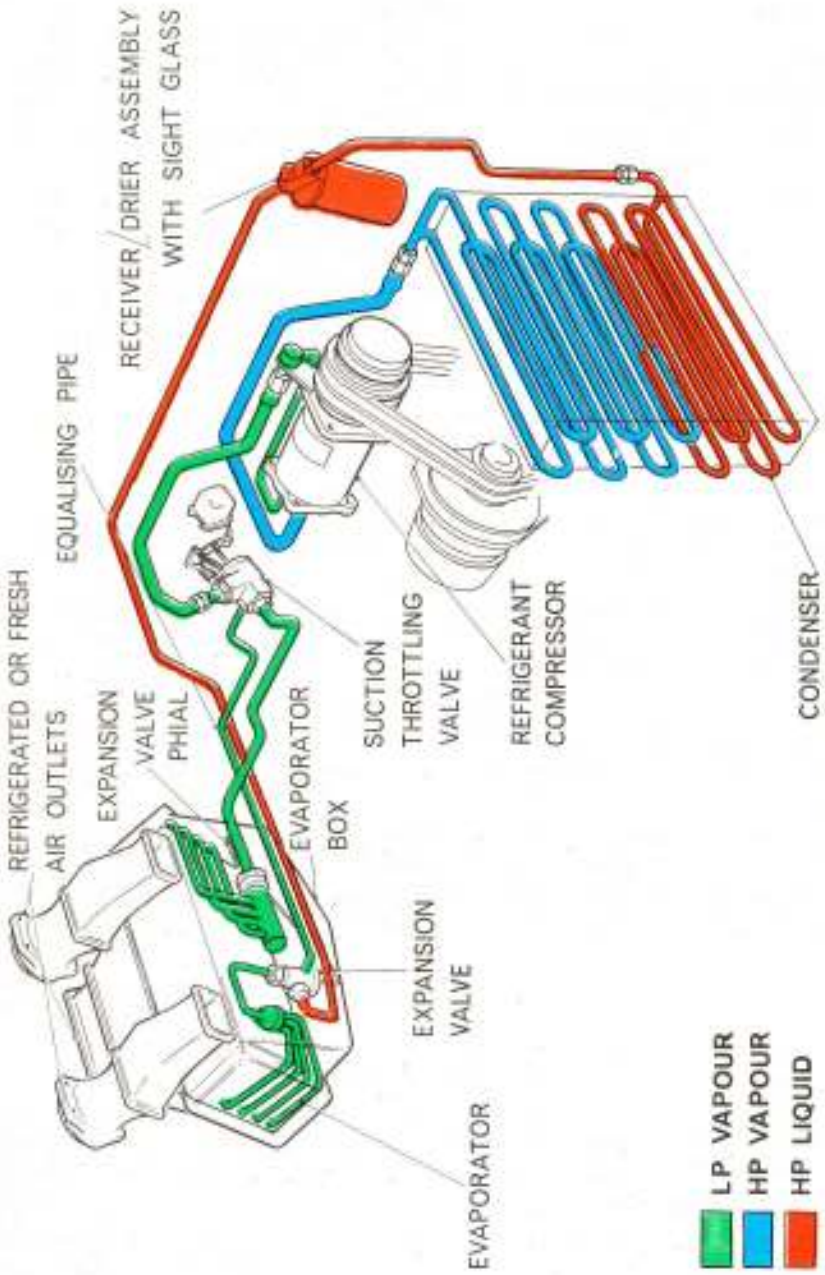


Fig 56 REFRIGERANT CIRCULATION DIAGRAM

Refrigeration system (if fitted) *(continued)*

Refrigerated or cooled air will be directed into the interior of the car through the two circular outlet ducts on the facia if the knob beneath each duct is withdrawn and through the outlet duct in the centre of the facia, when the flap is opened. Refrigerated air is not available through the ducts at the base of the windscreen.

In order to quickly cool the interior of the car after the car has been standing in the sun, especially in hot climates, operate the refrigeration system with the 'UPPER' switch in the fourth anti-clockwise position and with the blower motor switch lowered to the maximum speed position.

When driving the car with the refrigeration system operating, most of the refrigerated or cool air is directed towards the upper part of the car and therefore the lower part may become too warm. If necessary, this effect can be reduced by withdrawing the 'LOWER' switch to the required position in any of the clockwise positions; with the switch in this position, the internal flaps for the lower system are opened and part of the saloon air taken in through the recirculatory ducts by-passes the cooling unit (evaporator) and returns through the ducts below the facia and the ducts between the front seats.

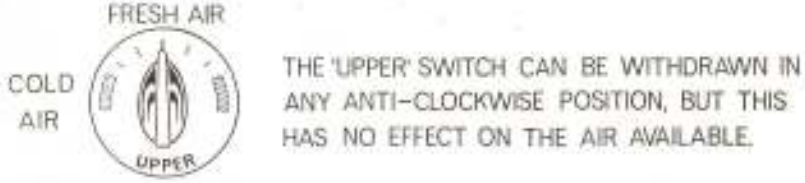

FRESH AIR
COLD AIR
UPPER
THE 'UPPER' SWITCH CAN BE WITHDRAWN IN ANY ANTI-CLOCKWISE POSITION, BUT THIS HAS NO EFFECT ON THE AIR AVAILABLE.

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Fig 57 AIR CONDITIONING SWITCH POSITIONS (CARS WITH A REFRIGERATION SYSTEM)

Maintenance

Every 6,000 miles, check the tension of the belts driving the refrigerant compressor (see Page 70). If the tension of one belt in a pair differs markedly from the other, a new matched pair of belts should be fitted.

Examine the condenser matrix mounted immediately forward of the radiator. Remove any insects, paper, etc., which might impede the flow of air through the matrix.

The following operation should be carried out only by an experienced refrigeration engineer.

Every 12 months, check that the refrigeration system is functioning correctly and if necessary top-up the system with refrigerant. If loss of refrigerant is evident, check the system for leaks.

Check the level of oil in the refrigerant compressor.

CHAPTER 11

BODY AND COACHWORK

The following instructions apply only to the Standard Pressed Steel Body; owners of coachbuilt cars should be guided by the special instructions issued with the car.

Paintwork

Whilst great care is taken in the course of manufacture to ensure that the paintwork is durable and highly finished, in service the paintwork is subject to conditions which may cause deterioration. In order to maintain the finish in its original condition, the following procedures should be carefully followed.

Always wash paintwork with clean cold water. **Under no circumstances should any attempt be made to remove dirt or mud when dry.** This practice can produce serious scratching, requiring professional repair. Water should be applied with a sponge and removed with a chamois leather. Automatic car washes are not recommended as, due to the detergents used, or due to the washing action, the paintwork may either be stained or lightly scratched.

Tar can be removed by one of the many proprietary solvents available or by gently rubbing with a soft cloth moistened with turpentine substitute.

Every three months, after the normal cleaning with cold water to remove mud and dirt, the weathered paintwork should be revived with Formula 2 polish and sealed with Formula 3 sealer. A tin of each is included with the car and should be used in accordance with the manufacturer's instructions marked on the tins.

De-icing fluid

If the necessity arises for a de-icing fluid to be used on the exterior of the windscreen, the instructions marked on the container should be strictly observed. Neat de-icing fluid should never come into contact with the paintwork and if it does, the fluid should be wiped off as quickly as possible.

Leather upholstery

Leather upholstery can best be cleaned by wiping over with a damp cloth. The occasional application of a little neutral soap will remove more obstinate marks from the leather. Caustic soap, petrol or other similar cleaning agents should not be used. An occasional application of Connolly's Hide Food will preserve the upholstery; this compound should be applied evenly with a clean cloth, then polished with a second clean dry cloth.

Carpets and head lining

Carpets should periodically be removed from the car and swept with a vacuum cleaner.

Stains or grease marks may be removed from carpets and the head lining by means of a mild detergent diluted with clean water.

Interior woodwork

Interior woodwork should periodically be treated in the same way as paintwork. It should be noted that water must never be allowed to lie upon interior woodwork for any length of time.

Door hinges and locks

The door hinges incorporate Oilite bushes and stainless steel hinge pins and should not therefore be lubricated. The application of oil may result in damage by causing dirt to adhere to the working surfaces.

The working surfaces of the door slam plates should occasionally be wiped clean and smeared with a small quantity of grease.

Bonnet fasteners

After long periods, the bonnet fasteners may become slightly stiff in operation due to dirt collecting on the mechanism. They should be cleaned occasionally and lightly oiled.

Plating

Stainless steel and chromium plating should be wiped clean with a damp chamois leather, then polished with a soft cloth. **Under no circumstances should a metal polish be applied.** Where tarnishing has occurred, a dilute solution of ammonia will usually suffice to remove it. This solution must not be allowed to lie upon paintwork for any length of time.

Whitewall tyres

The colour can be restored to whitewall tyres which have yellowed by using one of the proprietary brands of whitewall tyre cleaner. Brillo soap pads or other soap impregnated wire wool pads are convenient for cleaning whitewall tyres quickly whilst the car is being washed.

CHAPTER 12

STORAGE AND RECOMMISSIONING

The following instructions are relevant to storage periods not exceeding three months. Success depends upon correct initial preparation and regular subsequent inspection and maintenance. The storage building should preferably be heated but must be dry and well ventilated.

Drive the car for a sufficient distance to warm the oil in the engine, the gearbox and the final drive unit; this will ensure complete lubrication of the internal components.

Check the coolant level in the radiator and, if necessary, top-up with the correct anti-freeze or inhibited solution (see Page 68). Never leave the cooling system dry.

In order to take the weight off the tyres, raise the car with a jack and place supports under the rear trailing arms and the outer side of the front lower triangle levers.

Remove the sparking plugs and inject two tablespoons of anti-oxident oil into each cylinder. Suitable oils are Energol Protective Oil 20 and Castrol Storage Oil. Using the starter motor, turn the engine to distribute the oil over the cylinder walls, then fit the sparking plugs.

Do not deflate the tyres, but cover them to exclude light.

Top-up the gearbox with the approved lubricant (see Page 58).

For storage periods of more than six months, the following additional measures are recommended.

To prevent the formation of deposits of gum in the fuel system, drain the fuel tank and run the engine until the fuel system is empty.

Remove the covers and floats from the carburetter float chambers, then clean the chambers; refit the floats and covers.

Remove the fuel pump unit, allow the pumps to drain, then refit the unit.

Pour two gallons of paraffin into the fuel tank, then switch on the ignition to energise the fuel pumps and fill the system with paraffin.

Drain the final drive unit and the engine sump, then fill them to the normal levels with an anti-oxident oil (see above).

Remove and clean the battery. Fully charge the battery and if necessary top it up to the normal level with distilled water (see Page 105). Approximately once a month, re-charge the battery until the specific gravity of the electrolyte has remained constant for between ten and twelve hours on each occasion.

Inspect the rubber connections of the cooling system and renew any that are found to be unsound.

Thoroughly wash the bodywork of the car and repair any paint blisters or patches of rust in order to prevent further deterioration. Apply a good quality wax polish but under no circumstances use a polishing compound which contains ammonia.

Clean all chromium plating and stainless steel and lightly smear them with petroleum jelly.

Thoroughly clean the carpets, upholstery and cushions. Dust them with anti-moth powder and store them in a dry place. Treat all leather upholstery with an application of 'Connolly's Hide Food'.

If the storage building is dry, leave the car windows slightly open. If there is any tendency towards dampness, close the car doors and windows and place an anti-moisture compound such as Calcium Chloride in an open metal container inside the car.

Cover the car with a dust sheet.

RECOMMISSIONING AFTER STORAGE

Provided that the car has been stored in accordance with the recommended procedure, the following points only should require attention before using the car on the road.

Lower the car onto its tyres and check the tyre pressures.

Fully charge and fit the battery.

Drain the engine sump and final drive unit then refill them with the approved oils (see Page 58). Fit a new engine oil filter element.

Remove the sparking plugs and prime the cylinders with engine oil. Turn the engine by means of the starter motor to distribute the oil and to prevent a hydraulic lock. Clean the sparking plugs and if necessary set the gaps, then fit the plugs.

It is advisable after prolonged storage to remove the induction manifold and the tappet cover and to pour clean engine oil over the cams and tappets, filling the camshaft trough.

Check and if necessary adjust the contact breaker points. Lightly smear the distributor cam with the approved grease. Apply two or three drops of oil to the wick in the top of the distributor cam (see Fig. 42).

Drain all the paraffin from the fuel tank and disconnect the inlet pipes from the carburetters. Switch on the ignition to operate the fuel pumps and pump all the paraffin out of the system.

Remove the covers and floats from the carburetter float chambers, then clean the chambers; refit the floats, covers and inlet pipes.

Remove the fuel pump unit, drain the pumps and refit the unit.

Check the generator brushes for freedom of movement in their holders and clean the commutator. If an alternator is fitted, check the brushes for freedom of movement in their holders and clean the slip rings.

Recommissioning after storage *(continued)*

Lubricate all the grease points.

Check the fluid levels in the steering pump and the hydraulic reservoirs for the braking and automatic height control systems.

Fill the fuel tank and start the engine. Check the oil pressure and check for leaks of fuel, oil or coolant.

Finally, check the operation of all instruments, lamps and accessories.

ROLLS-ROYCE SCHOOL OF INSTRUCTION

The School of Instruction offers instructional courses on the maintenance of Rolls-Royce and Bentley cars. Each course is of two weeks' duration and covers the mechanical features of the car with particular emphasis being laid on points requiring adjustment or lubrication. Suitable cars, used for instructional purposes, have been made available to and are maintained by the School.

The course is intended primarily for chauffeurs who are undertaking the care of Rolls-Royce and Bentley cars for the first time. In the case of drivers who have had experience of previous models, arrangements can be made for a shorter course although it is recommended that the complete course be taken.

Owner-drivers and members of their families have frequently attended the School with beneficial results and arrangements to this end can be made on application to the Principal, School of Instruction, Rolls-Royce Limited, Hythe Road, Willesden, N.W.10. (Telephone: 01-969 2444).